JUNE

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THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION

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The Journal of the American Dental Association. Vol. XX, No. 6. Published by the American Dental Association, 212 East Superior Street, Chicago, Ill. Yearly subscription, $3.50. Entered as second-class matter, May 1, 1928, at the postoffice at Chicago, Ill., under the act of Aug. 24, 1912. Published monthly.
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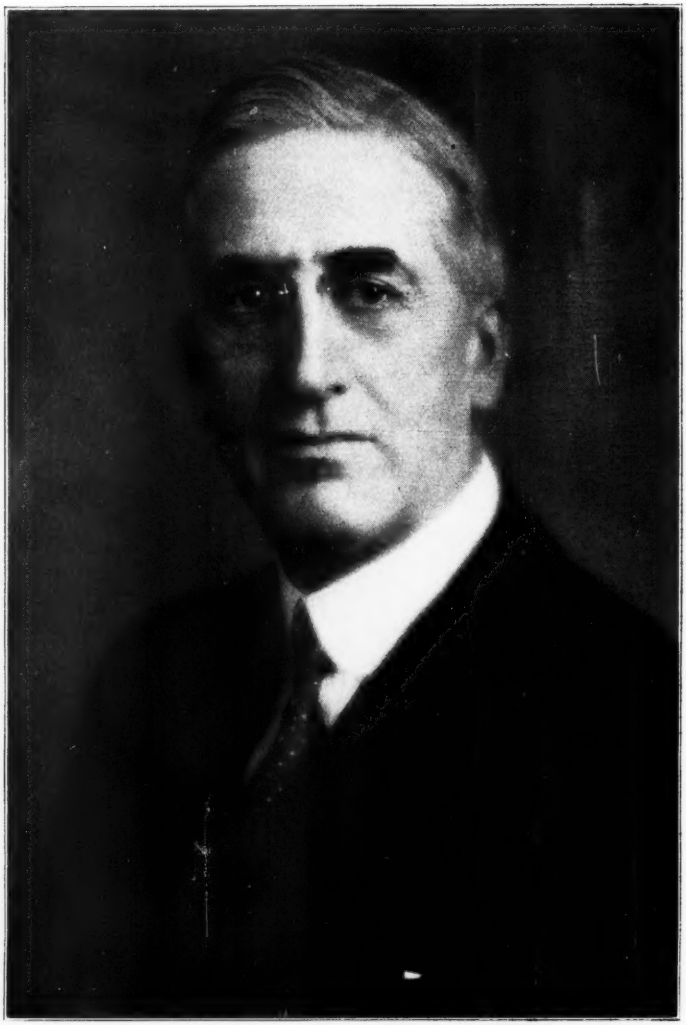

W. F. LASBY, B.S., D.D.S., F.A.C.D.
President of the American Association of Dental Schools

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THE JOURNAL
of the AMERICAN DENTAL ASSOCIATION

Vol. 20 JUNE, 1933 No. 6

Original Communications

PROPERTIES AND USE OF PLASTERS (A SIMPLE IMPRESSION AND DUPLICATING TECHNIC)

By J. V. GENTILLY, D.D.S., Cleveland, Ohio

I HAVE often felt reluctant to listen to a paper on so commonplace a subject as plaster of Paris. The things in which I was more interested were full and partial dentures, nicely polished cast inlays that would fit the cavity without binding and small or extensive bridges that would seat themselves without torsion to the abutment teeth.

When I noted full dentures dropped in the mouth, I criticized the laboratory for carelessness in the vulcanizing process.

When the partial dentures rocked in the mouth or the clasps and buccal portions of the saddles had to be eased before the appliance would fit, I believed that I had in some way distorted it.

That my inlays did not adapt themselves freely I believe was due to faulty technic.

My bridges did not fit because the investment did not expand sufficiently in heating to compensate for 1.25 per cent contraction of the gold. This aroused my interest in the characteristics and behavior of the gypsum products employed in prosthetic work, and the investigation which followed was indeed enlightening. It led me to obtain information from reliable sources and observe accurate tests as to the behavior of these materials. As a result of this investigation, I have found that:

1. Impression plasters have an expansion ratio of 0.5 per cent plus and expand in setting.

2. Some modeling compounds contract 0.5 per cent minus from the mouth temperature of approximately 98 to a 70 F. room temperature.

3. Wax contracts 0.5 per cent from mouth temperature to room tempera-

*Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

ture. With plaster, the impression is greater than the mouth area owing to the expansion of the impression plaster. With compound or wax, the impression is smaller than the mouth area owing to the contraction of compound or wax.

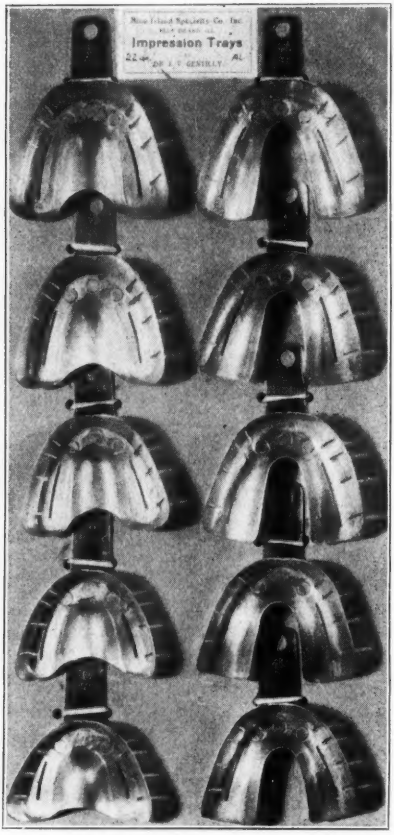

Fig. 1.—Assortment of slotted trays used in simplified plaster impression technic. (Gentilly, J. V.: Technic of Use of Slotted Tray for Sectional Plaster Impressions, J.A.D.A., 18:2177-2185 [Nov.] 1931.)

Plaster impressions, if allowed to stand, will not show any physical change for as long a period as ninety days after final setting, which is approximately one hour after being taken.

Impression plasters, or casts made from them, reach their maximum wet strength at from forty-five minutes to an hour and a half after the material has set. As excess water is evaporated, strength increases, until dryness is reached, when the strength of the cast is approximately three times its wet strength. Resoaking impression or model plaster casts after drying causes the strength to decrease to its original wet value. The maximum strength in plaster is desired when compression is applied in either the vulcanizer or the swager.

Raw plaster such as plaster of Paris has a compression strength of 2,500 pounds to the square inch. Slow setting stones have a compression strength of 5,000 pounds to the square inch. The

Fig. 2.—Blunt plaster separating knife, designed and adapted for insertion through slots of tray while plaster is setting, to determine depth of groove for separation of set impression plaster.

hydrocal groups, such as castone, and coecal have an approximate compression strength of 7,500 pounds to the square inch.

Hydrocal is the base of some high heat investments. It is a recalcined gypsum in which chemicals are incorporated by the manufacturers to reduce its water absorption power when heated to a high temperature. Most chemicals in hydrocal are alkaline in nature and are devastating to the brass rings when used in castings.

Castone has an approximate expansion ratio of 0.15 per cent on a 1 inch span. Kerr's agate has an approximate expansion ratio of 0.25 per cent to the inch. R & R's gray universal investment has a

setting expansion of 0.3 per cent and a thermal expansion at 700 C. of 1 per cent. It is hard enough to permit casting full and partial cases direct to the model and is suitable for inlays, crowns and bridges.

With this knowledge, I gradually eliminated some of my difficulties. I realized that I had to discard most of the older plaster which I had been using and that the following conditions must be present in plasters, stones and investment materials:

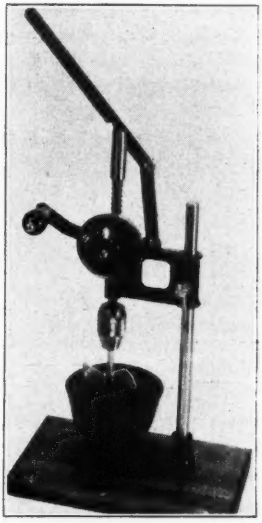

Fig. 3.—Dollar bench drill with propeller blade, an ideal mechanical hand operated spatulator for mixing plaster for impression work.

1. There must be a minimum amount of expansion from the oral field to the laboratory.

2. The stones or low and high heat investments must have a minimum amount of setting expansion when poured in plaster impressions or an expansion sufficient to compensate for the shrinkage of modeling compound impression.

3. The thermal expansion of the low and high heat investments must be uniform and must increase in a uniform curve to the temperature at which the gold is cast or soldered.

I realized that a knowledge of the characteristics of the materials which I used was essential. In the consideration of impression materials used in dentistry, plaster of Paris has the most romantic and historic background. It is obtained by burning and pulverizing gypsum, a natural rock known chemically as sulphate of lime. Gypsum, from which plaster is made, is so named from the two Greek words *Ge*, meaning the earth, and *Epsum*, to concoct, the entire word meaning to concoct in the earth. The symbol is $CaSO_4 2H_2O$. Gypsum is com-

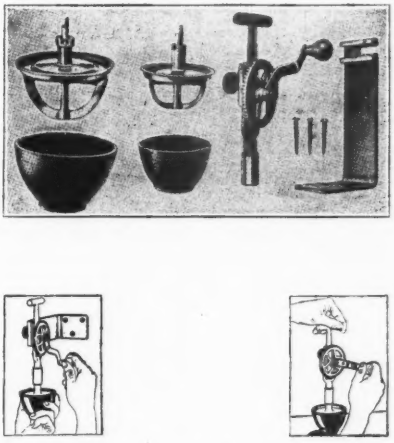

Fig. 4.—Improved hand operated mechanical spatulator. It is of stronger construction than is usual, with two sizes of spatulators, permitting the use of either small or large size mixing units. This combination offers a universal spatulator as it can be used for inlay, crown and bridge investments, impression plasters, artificial stones and hydrocal plasters. It can be fastened on the wall or used independently of the bracket.

mon to all parts of the earth and practically every country contains deposits. Immense quantities found in the tertiary stratum of Montmarte near Paris were used in the manufacture of an exceptionally fine grade of plaster used extensively in the making of statuary, vases and other plaster products. To differentiate this fine plaster from that of other

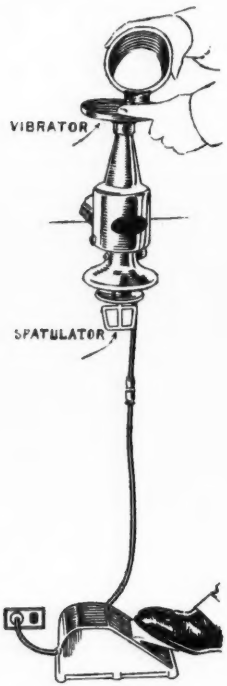

Fig. 5.—Forde mixer vibrator, high powered, motor driven combination spatulator and vibrator, for mixing all grades of inlay, crown and bridge investments, and for making hard, dense, bubble-free casts for swaging, casting and condensite and vulcanite work.

countries, it becomes known commercially as plaster of Paris. Its use by the early French dentist made it a staple article in the arts of the profession.

Plaster has been a transitory medium in the progress of man through his various stages of civilization. Back in the primitive days when men built their shelter, they, like birds and beavers, used mud, but soon they found a more permanent and more satisfactory medium, and thus the earliest efforts of civilization were directed to the use of plaster.

The pyramids of Egypt contain plaster work executed at least 4,000 years ago. This plaster was derived from burnt gypsum and was no doubt obtained in the same manner as the plasters of today. Very early in Greek architecture, we find the use of plaster, a most exquisite composition, thin, fine and white, to cover the temples both within and

Fig. 6.—Metal or bakelite disk which may be made to serve as base for glass duplicating flask. Either a 2-inch or a 3-inch carborundum stone may be used to grind the openings on the glass casserole, one opening for the pouring of the duplicating material and the other for the escape of trapped air.

without. This fine plaster was often used as a material on which to paint decorative ornaments. Pavements of thick hard plaster, stained in various colors, were common in the Greek temples, and some of these are known to have lasted hundreds of years.

It was about 300 B.C. that plaster was first used as an impression material. Credit for this is given to Lysippus, the first of the Greek Realists in sculpture. He took impressions of the faces of living sitters and presented the resulting casts to

his friends. A very interesting description of this phase of the use of plaster is found in the notes of the Italian painter Cennino Cennini, who was born about 1360. He wrote a book, compiled from his notes, of all recipes and directions for the conduct of all artistic processes known to him. He gives us directions in "How to Take Casts from the Face of Man or Woman." He cautioned his followers that when taking the cast of a person of high rank such as a lord, a king, a pope or an emperor, one should stir rosewater into the plaster; but for other persons, it

Fig. 7.—With cast centered on base under glass duplicating flash, pouring of duplicating material into flask through larger opening, making it possible to see cast until it is completely covered with duplicating material.

was sufficient to use cold water from fountains, rivers or wells. In making a cast from this mold, he advised the addition of a little pounded brick to prevent chipping when the mold is removed.

Plaster is the most vigorous, as it is the oldest vehicle for carrying down from generation to generation the masterpieces of art with which the Golden Age enriched the human race. The use of plaster in reproductions enables youth to contemplate antiquity in its noblest achievements. Reproductions made of plaster are often mistaken for the original. Plaster, lowly and cheap, but docile and durable, is the connecting agent with the greatest art of men's endorsement in the past. Plaster thus employed in duplicating works of marble, pottery and metal has today aided in the development of the finest industries. The Egyptians covered their granite sometimes, and sandstone always, with a thin coating of "plaster." The Greeks coated even their marble temples with plaster, and these portions are now in a better state of pres-

Fig. 8.—Model and duplicate in R & R gray universal material made in "dupli com" mold poured into glass duplicating flask. The carborundum wheel on the lathe is used for grinding the openings in the pyrex glass casserole. The felt wheel on the lathe is used for vibrating the investment into the mold. This is not necessary when other types of vibrator are used.

ervation than the ancient unprotected masonry.

There should be no doubt in the minds of most of us that the art of dentistry, especially its prosthetic phase, would not have achieved its present success were it not for the wonderful reproductive properties of plaster, and mention of its early history should be both interesting and in-

structive. Plaster is and may always be the ideal impression material. It has undergone various steps of refinement and even though numerous elastic gum compounds and colloidal preparations have been presented to the profession for use as impression materials, none of these have as yet surpassed plaster in obtaining accurate reproduction and in responding to the required thermal changes.

The dentist, in his use of plaster, must work toward a greater degree of accuracy than is required of any other plaster craftsman. It is therefore essential, first, that all types of dental plaster conform to rigid specifications, and, secondly, that these plaster products be correctly used by the dentist if his inlays and dentures are to be satisfactory.

Dental plasters are prepared from the purest, specially selected gypsum rock. Every step in the manufacturing process is carefully controlled in order to assure uniformity of quality, and the final product is thoroughly tested to insure conformation to specification.

With the modern method of calcining, powdered gypsum is run into kettles which are ordinarily from 10 to 12 feet in diameter and from 5 to 6 feet in height. These kettles are pierced by flues and are set up in brick work with a furnace underneath them. The kettles are provided with agitating arms to keep the plaster well mixed during the calcination process. Until a few years ago, most dental plasters were calcined to the so-called second settle or soluble anhydrite stage; that is, the product was heated until all water of crystallization was released and the finished product was dumped at a temperature of from 400 to 450 F. The product was then stored until it had absorbed one-half molecule of water from the atmosphere and had reverted to the hemihydrate stage. It is now possible, by means of aridizing, to calcine the plaster directly to the hemihydrate stage and dump at a lower temperature of 330 F. This precludes aging the product to allow for rehydration in the atmosphere and still results in a plaster of low consistency, high strength, and stable aging characteristics. All dental plasters now made by the United States Gypsum Company are processed in this manner.

The introduction of better machinery for the treatment of the plaster before and after calcination has provided the profession with a material that is smooth, plastic, and definite in its formula, so that we are now able to determine with a simple equipment any variations we may require in plasters, stones and investment materials.

I do not hesitate to say that the reason we are more successful with castings both small and large is that we are furnished with plasters which have been carefully formulated to respond with accuracy to the various requirements of manipulation.

In the early years, dentists were compelled to use the raw plaster or calcined plaster, a burned plaster, for practically all of their work. An accelerator, either potassium sulphate or sodium sulphate, was used to hasten the setting required for impressions. A thick mix, vigorously spatulated, without the addition of an accelerator, was employed for the casts, vulcanite work and various types of gold work.

The hard finish or artificial stone plasters were obtained by subjecting the gypsum containing certain natural impurities to a higher heat than that employed with plaster of Paris. The gypsum was then treated with such substances as alum, potassium carbonate, borax, potassium or sodium sulphate. This form of

plaster required a longer time to set, often overnight, but the result was a hard, dense, tough cast suitable for swaging.

The addition of silicon dioxide (occurring in crystalline and amorphous forms, dark and fusing at high temperature) to plaster furnished a material that would tolerate high heat, which made it suitable for soldering crowns and bridgework.

Self-separating plasters or soluble plasters are mixtures of starch with plaster which, when mixed with water and set in the usual manner, have the property of disintegrating in hot water. Their use is confined to impression work, and their advantage lies in the fact that they may be separated from the cast merely by immersion in cold water and heating to the boiling point, the usual cutting and chipping of the impression and the liability of mutilating the cast thereby being thus avoided. Soluble plaster is used exclusively in the making of impressions for partial dentures and bridgework.

The manufacturers of dental plasters, being particularly interested in complying with the requirements of the profession for better grades of plasters for various purposes, have employed expert physicists and dentists with scientific training to solve the problems regarding plaster, so that now we are receiving impression plasters, artificial stones and investment materials that respond accurately to their formulated setting time, setting expansion, crushing strength and thermal expansion, to compensate to some degree the behavior of the golds used in castings. With the coming demand for white golds in our practices, to meet the esthetic requirements that the use of platinum colored jewelry has established, it is apparent that we may undergo an evolution which may bring within our field some of the white base alloys, the casting of which may require plasters and investment refractory materials of an entirely different texture from that of those which we are employing today.

Chemically, set gypsum is neutral, being neither alkaline nor acid in contact with water. It is also chemically stable, having a comparatively low solubility and not being acted on by acids, alkalis or oxidizing or reducing agents at ordinary temperatures. These properties render plaster peculiarly adapted for use as models in preparation of all types of dentures and bridgework, as the plaster has no chemical effect on any denture material during the curing process, nor is gold affected by the plaster base investments into which it is cast.

The following data on the characteristics and behavior of plaster have been obtained from the research department of the U. S. Gypsum Co. and the United States Bureau of Standards and may be relied on for its authenticity.

The Committee on Dental Research of the American Dental Association, through its department in the Bureau of Standards, found that many of the highly recommended and popular plasters did not fulfil the claims of the manufacturers. The manufacturers thereupon developed a product that would comply with requirements. Many of the older makes of plasters are now replaced with products having a very low expansion ratio.

Plaster of Paris, or hemihydrate, contains theoretically 6.2 per cent chemically combined water. The water content of the unset plaster may increase by as much as 1 or 2 per cent if exposed for a long time to the atmosphere, particularly under conditions of high humidity or dampness. This water does not chemically combine with the plaster to form gypsum

under ordinary circumstances, but rather is absorbed. Plaster of Paris, on standing, loses much of its life, or plasticity, and, on mixing with water, does not whip to a creamy, smooth consistency, but becomes granular and feels dead and coarse. In addition, the amount of gaging water that must be added to the plaster to bring it to working consistency decreases about 15 to 20 per cent. The time of setting is affected by aging. An aged plaster generally lengthens out slightly in setting. If the plaster is accidentally wetted or even allowed to become damp, before use, a portion of it will chemically combine with the water to form set up gypsum which will show itself in the form of lumps in the plaster. Such contamination greatly damages the plaster. Its setting time is accelerated because of the gypsum present; its strength is decreased, and its smooth working properties are destroyed. It is essential therefore that plaster used for impressions or casts be not subjected to undue exposure to the air, as this will materially affect the aging and physical properties of the plaster. The plaster should be kept in a dry place and in closed containers and when used should be sifted into the water bowl.

The strength of set plaster of Paris is very greatly affected by the amount of gaging water used in mixing it. The stiffer the mix prepared, the greater its resultant strength. The setting time of plaster does not exert any appreciable influence on strength. In fact, it has been noticed that very slow setting plasters (that is, plaster of Paris) which, during the setting process, develop fairly large gypsum crystals are generally weaker than similar plasters accelerated to a quick set with consequent rather small crystals. Ordinarily, potassium sulphate is used as an accelerator in the manufacture of most impression plasters, and this salt does not appreciably reduce the strength of plaster of Paris unless it is added in amounts of over 0.50 to 0.75 per cent. Most impression plasters are purposely made rather weak so that casts made from them can be readily separated. Inert fillers are sometimes added to impression plasters to decrease the strength of the plaster of Paris. Incidentally, it may be of interest to learn that potassium sulphate not only acts as an accelerator of the time of set, but its use also decreases very decidedly the natural setting expansion of plaster of Paris. Its use in impression plaster, therefore, not only gives the latter its necessary quick setting time, but also assures a very low expansion, which reproduces detail very satisfactorily.

There are various makes of impression plasters on the market suitable for our purpose, each corresponding very closely to the specifications accompanying the package.

If we wish our models to be uniform with regard to the characteristics of strength, density, expansion, water absorption and surface hardness, we must weigh the plaster and measure the water used for the preparation of each mix. There are operators who attain a fairly uniform plaster: water ratio by sifting the plaster into water until a mix of the desired consistency or fluidity is obtained. To avoid the necessity of measuring the plaster and water each time a mix is made, it is suggested that quantities of impression plaster for large and small mixes be kept in hermetically sealed paper cups. With the addition of the required amount of water, gaged in a marked glass or graduate, accuracy will result and the annoyance of arranging the scales and measuring cups will be eliminated. The water ratio required to give the best results with a given plaster should

be determined and rigidly adhered to in making all mixes, as the characteristics will often vary with each new can. Method and time of mixing play an important part in obtaining a uniform plaster impression and plaster cast.

The dry powder should be sifted into the rubber bowl containing the required amount of gaging water. It is essential that plaster bowls and spatula be scraped clean, as the contact of small pieces of set plaster with a fresh mix will result in contamination of the latter. The bowl containing water and powder is allowed to stand until the excess water has all been absorbed. If a cone of plaster remains exposed in the center of the bowl, it should be moved to the sides with the spatula in order to complete the initial soaking process. The soaking process will ordinarily require from about one-half to one minute.

Lumps in the mix are caused by the trapping of air in the dry plaster, and the lack of water absorption during the soaking. In order to prevent this, the dry plaster must be completely covered with water.

The mix should then be stirred vigorously with a spatula for at least thirty seconds. A sidewise stirring motion is recommended. The plaster should be well mixed from the bottom of the bowl, a homogeneous, plastic mass, free from lumps and air bubbles, being thus assured. (Figs. 3-5.) Mechanical spatulators are recommended in the mixing of plasters, the hand operated slow speed type for impression plasters and the motor or high speed type for artificial stones and investment refractory materials.

The dentist has observed that the introduction of mechanical mixers in the ceramic industry has enabled pottery manufacturers in many cases to more than double the life of their plaster molds.

Hand spatulation of inlay investment can never produce the results obtained by mechanical spatulation, and the same applies to stones and high heat expansion investments.

It is said that the strength of gypsum casts is increased from 5 to 10 per cent with efficient stirring. Increasing the time and speed of stirring proportionately accelerates the setting time. One should use caution not to stir plaster into the setting mixture. This error may be observed when the mix begins to stiffen. It disturbs the knitting together of the growing gypsum crystals and the result is immediate setting of the impression plaster and a weak nonhomogeneous mass in the cast or investment material.

A plaster impression in which a gypsum cast of stone or high heat investment is to be poured must be treated with a separating medium. If not so coated, the impression will desiccate the mix cast into it, and the resulting model will be unsuited for vulcanite or gold work. It will be harder in some places than others owing to unequal water absorption. The common practice is partially to dry out the assembled impression and apply a thin coating of separating medium. After the separator has dried, it should be immersed in water for a few minutes, after which the cast is poured. The base of most separating mediums is sodium silicate.

It is necessary that sufficient time be allowed after the apparent set of the cast for it to reach its maximum wet strength before any further work is done on it. Crystallization of gypsum is not complete for almost an hour after setting has apparently taken place, and until all the hemihydrate present has been converted to gypsum, strength will continue to increase.

Investments in particular contain only

a relatively small proportion of plaster and, if care is not exercised, the sharp margins are apt to be damaged and the investment details marred.

SETTING TIME

Setting time is the period required for plaster of Paris to harden after the addition of plaster to water. For practical purposes, two stages in the setting of plaster are recorded, the initial and the final. The initial setting indicates the length of time plaster may be worked or molded. The final setting indicates the length of time which must elapse before the plaster cast is hard enough for use. The time of final setting does not correspond with the point of maximum strength. This is arrived at several days later.

SUMMARY

If plasters are to respond to requirements:

1. They must be kept in sealed containers, stored in a dry place, and protected from contamination with other materials.

2. The containers for artificial stones and investment compounds should not be jarred as this causes the chemicals and heat resisting ingredients to separate and settle to the bottom. The same is true of impression plasters which are incorporated with an accelerator.

3. All plasters should be weighed and sifted into the proportionate amount of water.

4. A clean plaster bowl and spatula should be used in mixing plaster to prevent trouble in the time of setting and to assure uniform working qualities. The same spoon should never be used for carrying different grades of plaster unless it is thoroughly clean.

5. Careful control of plaster to water ratio for any given plaster product should be secured to assure uniformity of setting, of strength, of expansion, of hardness and of absorption.

6. In mixing, the plaster should be sifted into the water, allowed to soak for a given length of time and always spatulated in the same manner to secure a uniform and stable mix. Mechanical spatulation is preferable to hand mixing as a means of removing trapped air.

7. A mechanical vibrator should be used to assure smooth, dense and bubble-free surfaces.

8. Sufficient time should be allowed for models to strengthen before they are removed from the impression or are worked on.

Close adherence to the specifications and instructions that come with the package of gypsum products will insure the maximum of satisfactory results.

Impression Plasters; Models.—Plasters used for impressions, models and investments generally differ only in setting time, and this setting is adjusted by use of chemicals such as K_2SO_4 or raw gypsum, or what is called second settle stucco. These plasters are made by heating the gypsum at low temperatures (250—350 F.) in an open kettle to form $(CaSO_4)_2H_2O$, or hemihydrate.

Artificial Stones.—The artificial stones are made from the same kind of rock but burned in a high temperature (over 1,000) in a rotary kiln to the anhydrous $CaSO_4$. This anhydrous $CaSO_4$ is then treated with chemicals to cause it to set properly and give it its desired properties. Artificial stones are commonly known as Keenes' cement.

Coloring Matter.—The coloring matter used in investments is usually an organic aniline dye. In plasters, mineral pigments such as ochre may be used.

Difference in Hardness.—The main cause for difference in hardness of plaster, artificial stone and hydrocal is in the wa-

ter consuming power. In plaster, the water consuming power is 60; in artificial stones, 30; in hydrocals, such as castone, coecal, dent pro cal and Baker's speed rock, 30.

Hydrocal.—Hydrocal is made by calcining gypsum in closed kettles under 45 pounds pressure. This pressure is released and the calcined gypsum dried quickly. Then chemicals are added to adjust setting, setting expansion and hardness.

Accelerators and Retarders.—Potassium sulphate is added to all gypsum products employed in dentistry to regulate the set. The better grades of impression plasters are combined with sufficient quantities of potassium sulphate to reduce their setting time, allowing a working range from three to five minutes.

Sometimes, retarders are added to allow a longer manipulation time. For this purpose, alum, vinegar and acetic acid are used. A combination of ox blood, potassium nitrate and acetic acid is also used as a retarder. In my practice, I use powdered marshmallow root, one-eighth teaspoonful to a mix of plaster. This has a pleasant taste and is not at all disagreeable to the patient. A retarder will provide for additional plaster in the mix, making a denser mass and enabling the operator to mix the plaster very thick, to produce the required displacement or compression of the soft tissues during the impression process.

The products of gypsum are essential to the practice of dentistry and, as stated before, a knowledge of their behavior should be of interest.

EXODONTIST'S AND GENERAL PRACTITIONER'S OBLIGATION IN HANDLING THE REFERRED PATIENT*

By ERNEST W. BROWNING, D.D.S., Salt Lake City, Utah

OBLIGATION, according to Webster, is the binding power of a vow. Any dentist who has not many times taken a vow to protect the life, health and happiness of his patient has missed his calling, and the sooner he finds it out and takes up a new vocation, the better off dentistry and humanity in general will be. In law, obligation is a bond to which a penalty is annexed on failure of due performance. And how true it is in dentistry that every time a dentist fails in his obligaton to his patient, the penalty is a diminishing of his practice. From the moment a patient enters our reception room, we should appreciate and respect his confidence by devoting our most conscientious efforts to his health and welfare. Our every thought, word and deed should be in fulfillment of our obligation to that patient.

At present, owing to economic conditions, our obligation is greater than ever before. We are called on to forget the monetary side of our work and de-

*Read before the Section on Oral Surgery, Exodontia and Anesthesia at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

vote all our efforts to benefiting the patient. Many financial geniuses of yesterday have been reduced to poverty, and it will be doubly difficult for these people to realize their situation. As in the past, they expect the best possible service. If our obligation means all that it should, we are going to give all and more than they expect. Most of us have more leisure time now than ever before, and we should devote as much of that time as possible to charity. Here we have an opportunity to put dentistry beside medicine in the exalted place where it belongs.

To determine the general accepted opinion as to what the exodontist's and general practitioner's obligation to the referred patient consists in, a questionnaire was sent to every member of the American Society of Oral Surgeons and Exodontists. To assure an unbiased opinion, three additional questionnaires were enclosed to be filled out by general practitioners as follows: those referring all extraction cases; those referring only difficult cases; and those referring no cases to the exodontist. A questionnaire was filled out by every dentist in a city of 150,000 population, and also filled out by twenty consecutive referred patients in order to get their point of view. The data secured, obtained as they were from all parts of the United States, should comprise the general opinion of the entire profession.

One question asked was: "To whom is your greatest obligation in handling the referred patient?" The replies were overwhelmingly in favor of the patient, resulting in a vote of: the patient, 482; the general practitioner, ten; the exodontist, sixteen; and to all three, fourteen. This should settle beyond question that the obligation to the referred patient is paramount.

When a physician encounters a baffling case, does he assume a dogmatic air and attempt to treat it? Indeed he does not. He resorts to consultation and, if necessary, calls several of his fellow practitioners in on the case. Do they all agree? Of course they do not, but they arrive at a sane procedure, with the result that the patient receives the best possible treatment. Does the patient respect his physician any less for having called other physicians? Certainly not: in fact, the laity are becoming so well educated that they readily consent, and, in some cases, ask that some one else be called in consultation.

Are we going to await the time when the patient will demand that we call some one in consultation? Certainly, in the past, some dentists have been very derelict in their duties in not resorting more often to consultation. A youth, aged 19, had the right upper lateral incisor extracted by his regular dentist. The following day, his face was extremely swollen; and this swelling persisted for five days. The boy visited his dentist regularly for treatment, consisting of irrigations with a mild antiseptic solution. On each visit, the dentist, despite the fact that the adjoining teeth had become very loose, would say everything was coming along all right. After four weeks of such treatment and assurances, the patient became dissatisfied and consulted another dentist. At this time, the central incisor, cuspid and both bicuspids were extremely loose and some pus was present, with very little swelling, but considerable edema. The second dentist did not recognize the condition, but was wise enough to call an oral surgeon in consultation. The roentgenogram confirmed the oral surgeon's diagnosis of osteomyelitis. It was necessary to remove the four adjacent teeth and, with proper treatment, complete recovery was effected in three weeks' time. Needless to say,

the oral surgeon had to do considerable explaining to prevent a malpractice suit against the first dentist. No one should accuse the dentist of producing, or even condemn him for not recognizing, the osteomyelitis, but he should be censured for not observing his obligation to the patient by resorting to the cheapest, and yet most valuable asset at his command, namely, consultation. Instead of harboring a feeling of jealousy for the man who can recognize an abnormal condition, instead of shunning him because he is successful, we should cultivate his friendship. Association and consultation with a successful man will always prove profitable.

Recently, an eminent lecturer and successful oral surgeon granted an interview to two energetic young dentists who thought they had solved one of the exodontists' perplexing problems. After the interview, he was asked by another oral surgeon why he had not criticized their work when he knew they were following technics that had been discarded years ago by the specialists. His reply was that he did not wish to kill their enthusiasm. Think of it: he had allowed them to leave the room convinced that they had won an argument because he realized that only the surface had been touched in the progress that even the removal of teeth has made. Who knows but that, in their enthusiasm, with their youth and vigor, they may be the ones to make much needed improvements? Fraternizing, consulting and cooperating will make of each of us a better man. If our obligation is first of all to the patient, let us make it a point to give the patient the advantage of consultation on any point on which there is doubt.

The patient's physical comfort, although not so vital, is just as much a part of our obligation as is the patient's health. Whether we are general practitioners or exodontists, if we have not mastered the technic of removing teeth painlessly, we have no right to attempt the removal of a tooth. A painless extraction does not mean freedom from pain at the time of the operation only, but also postoperatively. Conduction anesthesia was a godsend to dentistry, but unfortunately even an incompetent operator is able to anesthetize a tooth and the surrounding tissues to the extent that the tooth is removed painlessly. On the other hand, that the operative technic is incorrect manifests itself in postoperative pain. Certainly our obligation is to see that the patient suffers as little as possible afterwards, and undoubtedly skill minimizes pain. The patient's mental comfort likewise should have our attention. This requires that we study psychology and endeavor to analyze what is going on in the disturbed mind of the patient. What is more disconcerting to the patient than a grinning, "wise-cracking" dentist at the time a tooth is to be extracted? In most cases, he dreads that extraction more than he would a major operation. Whether he suffers mental anguish or all mental discomfort has been dispelled will be remembered long after the actual operation is forgotten. Therefore, unless the patient is assured the maximum of both physical and mental comfort at our hands, we have failed in our obligation to him.

The exodontist most certainly fails in his obligation to the patient when he completes a full-mouth extraction without making certain that the man who is going to make the dentures receives the extracted teeth. The patient's appearance is a part of our obligation and the prosthetist is entitled to know the size, shape and color of the natural teeth. In dentistry many enviable reputations have been built solely on a keen sense of es-

thetics. If you have not mastered the art of esthetics, call in the nearest dentist who has. He will feel complimented and will be pleased to assist you. Also, the impression produced on the patient will be gratifying.

No dentist, whether a specialist or not, is entitled to charge a fee in excess of what the patient can afford. One of the main reasons that the world is in its present condition is that we have all been oversold. We must also keep in mind that, as a rule, the most expensive dentistry is the cheapest after all. Likewise, in thousands of cases, the services of an exodontist would be less expensive in the end. For example, a patient presented herself to an exodontist and asked his fee for the removal of two impacted cuspids. After examining the roentgenograms, he decided that $50 would be a reasonable fee. The patient was desirous of consulting other men regarding the work and, as is always the case, it was not difficult for her to find a dentist who was ready and willing to remove the teeth for $25. Somehow the dentist forgot his anatomy and, in making certain that he would have an accessible field, made an incision from second molar to second molar, passing directly over the nasopalatine foramen. He chiseled and dug and mutilated tissue for one hour and fifty minutes, until the patient was worn out and could endure no more torture. The dentist then called the exodontist to help him out, with the excuse that the anesthesia had worn out and the patient should have nitrous oxid. The exodontist removed the two impacted teeth and sutured the mutilated soft tissue back in place as best he could. Realizing there would no doubt be a postoperative hemorrhage, due to the incision, he suggested the patient's removal to a hospital. The provincial father insisted on returning home immediately, home being a little town 40 miles from the nearest physician or dentist. To make a long story short, the third night after the operation, a secondary hemorrhage developed that nearly cost the girl her life. She was hospitalized for six weeks and received several blood transfusions, and incidentally the experience cost the father over $700. The point here is not alone that "economy" did not pay, but also that the general practitioner is to be condemned for failing in his obligation, in attempting something that he was not equipped to do, and the exodontist should be condemned emphatically for not demanding that the patient go to a hospital. He neglected his most sacred duty, the obligation to protect his patient's health. We are all aware of what is the best thing to do in correcting any dental defect, but the money-mad world, under favorable conditions, might have driven some of us far from the straight and narrow path. Everything has its virtues—even the devasting depression has taught us how to live better. We have learned that plain wholesome food makes a much better diet than caviar. The depression played havoc in some walks of life, but it was a life saver to dentistry. With the decline in business, dentistry has become so highly competitive that we are compelled to render a better service than ever before. During the period of prosperity following the war, some dentists unfortunately were swept with the tide to the point that dental economics replaced the basic fundamental principles of health. We have seen expensive dental appliances placed even in the working man's mouth on weak, undermined abutments. Could it have been because of the almighty dollar that when the patient asked for the best, we misunderstood and sold him the most expensive? It is true that the better a man is paid,

as a rule, the better service he delivers. But as we are not the sole judges of our worth, let us not get an exaggerated opinion of ourselves lest we be toppled from our throne. The law of supply and demand is compelling us to do modern but not fantastic dental work.

The dentist who does not like extracting will never be successful at it, and even though his patients insist, he should avoid ever extracting a tooth. His failures will far outnumber his successes. The patient soon forgets that he insisted on the general practitioner's removing the tooth, but he never forgets the failure that may ensue. Such failures have cost the dentist many good friends.

Unfortunately, there is no law saying that a certain man who was cut out for a shoe cobbler cannot in some way become a bank president, with power and authority to invest our money. The past decade has demonstrated that some of us may not have used adequate care in selecting the one with whom to invest our money, but there can be no legitimate excuse for the general practitioner's not selecting the most efficient exodontist. It is the general practitioner's obligation to demand that the patient go to the exodontist who is trained and equipped to render the best service. Personality, reciprocity, friendship or business relationship should not enter into the dentist's decision in handling the case. The general practitioner, having satisfied himself as to the exodontist's ability, should not send the patient with the excuse that he does not give nitrous oxid. Allow the exodontist the privilege of selecting the anesthetic that he thinks is best for a given case. Be frank and truthful with the patient; he will admire you the more for it. In fact, to this question, "Did you lose any confidence in the general practitioner for his having sent you to the exodontist?" seventeen of twenty consecutive referred patients answered that their confidence increased, because they realized that he was doing it for their welfare.

The specialty of exodontia is just as important and necessary to dentistry as surgery is to medicine. The public knows that every physician cannot be a good surgeon, and yet they are aware of the fact that a good diagnostician is just as important as the surgeon. For the same reason, they should not expect every dentist to be proficient in exodontia. To the question, "Do you believe that the exodontists in your city have the knowledge and training necessary to be known as specialists?" 334 general practitioners answered "Yes," ninety-four answered "Not all of them," and only four answered "No." To the question, "Do you think the exodontist is better equipped than you are to render the best service to the patient?" 426 answered "Yes," twenty-two answered "Yes, in difficult cases," sixty-five answered yes, with reservations, and only thirty-five answered "No." Yet in answer to the question, "What percentage of your extractions do you refer to the exodontist?" the average percentage was given as 35.5. In the city where each dentist was questioned, the average was only 21.5. To the question, "Do you consider the exodontist a benefit?" 406 answered "Yes," and only ten answered "No." If 94 per cent of the dentists think the exodontist is better qualified and 98 per cent think he is a benefit, and 99 per cent think he has the necessary knowledge and training, why do they send only between 21 and 35 per cent of their extraction cases to the exodontists? It can only partially be accounted for by financial conditions because more than 70 per cent answered that finances were not considered when referring patients. To the question, "Do you think

the patient gets a good or bad impression of you for referring him to an exodontist?" the answers were: good, 297; bad, eighteen; and no difference, forty-five. The patient must therefore have been satisfied in the vast majority of the cases. It appears from these answers that a large portion of the general practitioners' conclusions have been derived from dealings with incompetent exodontists. There are skilled and competent exodontists in every city, and therefore the general practitioner's obligation demands that he exercise his prerogative and eliminate the self-styled and incapable specialist.

The specialty of exodontia and oral surgery had its origin in the fact that a few men recognized in themselves a natural ability in surgery. They were also aware of the fact that if a man rendered only one service, he was more apt to do it well. It was only natural that the pioneers in exodontia and oral surgery who were clever and had ability for the work became successful financially. These men had a natural ability that would have stamped them as a success in any line of endeavor. Unfortunately, their financial success may have caused another group of men to specialize. If financial conditions alone prompted any man to take up this special work, he should be discovered and eliminated. As there are unscrupulous men in every walk of life, so are there apt to be unscrupulous men in our profession. But if a man is conscientious and has the patient's welfare at heart, his love, or even need for the dollar, is soon forgotten.

The surgical side of dentistry advanced by leaps and bounds. The correct removal of a tooth today is as different from the pulling of a tooth fifteen years ago as black is different from white. Who was responsible for this improvement? The questionnaire disclosed that the specialist played the greatest part in this advancement. It was the teaching of nerve blocking, the correct administration of nitrous oxid, the preparation of the mouth for dentures, the designing of instruments and the care of the patients which the exodontists so willingly gave to the profession that brought about the improvement. No group in dentistry have been more faithful to their work, have attended more meetings or have invested more money in dentistry than the exodontist. Naturally, his diligent study and application caused him to advance, and advancement has always caused jealousy. We should all be broadminded enough and interested in our work to the point that there is no room for petty jealousy. Instead, we should congratulate and encourage the man who is progressing. It is progression that makes the world a better place in which to live.

What to do when an unreferred patient asks, "To whom shall I go for dental work?" has always given the exodontist much concern. This question placed the exodontist between two fires. If he recommended some one, he felt he would incur the enmity of the men not mentioned. If he answered that he could not recommend anyone, he failed in his obligation to the patient, because the patient was just as apt to pick a quack as he was to pick the most capable dentist. The answer is to be found in the replies to the question, "If an unreferred patient needs dental work, should the exodontist recommend a dentist?" 386 answered "Yes," and 125 answered "No." Granted, then, that the dentist is in duty bound and perfectly within his rights, the question arises as to how he should arrive at a decision regarding whom to recommend. The majority answered, "The

best general practitioner for the case." The next highest vote was "Reciprocate, if they be capable dentists." Other answers in the order of choice were as follows: "Upon his qualifications"; "Class of work and type of patient"; "Service required and ability to pay," and "Name several good dentists." Some of the negative answers were: "He should not refer anyone"; "For his own good, no"; "Send to his physician for advice"; and "Have the patient ask a friend." It is obvious from these answers that the exodontist has much to consider before arriving at a decision. If he will use common sense and keep the patient's welfare always in mind, he should not go far wrong.

In handling the referred patient, there exists an equal obligation between the exodontist and the general practitioner. In answer to the question "Have you lost patients by referring them to an exodontist?" 142 answered "Yes" and 258 answered "No." When 35 per cent have lost patients, we must assume that something is radically wrong, or some one is mistaken. The main reasons given for the loss of patients were as follows: "Sent to other dentists"; "The exodontist did the restorative work"; "Unsatisfactory treatment by the exodontist," and "The exodontist forgot his speciality." If these reasons are proved true, there can be but one answer, and that is that the general practitioner should request the services of another exodontist. Other reasons given were: "Their friends sent them elsewhere"; "Might happen to anyone"; "We lose patients all the time for various reasons," and "Loss of contact." The answer here is obviously lack of cooperation between the general practitioner and the exodontist. For example, the general practitioner refers a patient to the exodontist, who removes the teeth as instructed. For some reason, the patient does not return to the general practitioner. If the general practitioner would inform the exodontist, it would be an easy matter for the exodontist to call the patient, inquiring about his recovery, and at the same time ascertain the reason that he had not returned to the general practitioner. Too often, the general practitioner has assumed that the exodontist has shifted the patient to some one else, when, in reality, some friend of the patient may have been responsible. Any exodontist who would betray the general practitioner's trust by directing a referred patient to some other dentist should be exposed, and if the case were properly handled, he would perhaps be looking for a new location in a very short time. On the other hand, he should not be accused of diverting patronage until positive proof of his guilt is established. This is an obligation that we owe each other.

In answer to the question, "If the exodontist sees dental work needed should he mention it to the patient?" 416 answered "Yes," 120 answered "No," and eleven answered "Consult the dentist." The fact that a large majority answered "Yes" places an additional obligation on the exodontist. In the past, the exodontist has feared to say anything to the patient other than concerning the extracting. Every exodontist realizes the great amount of good that he could do the general practitioner and the patient by impressing on the patient the absolute necessity of correcting a fault at its earliest inception. He should never extract a tooth without pointing out the havoc played by delayed replacement. After the extraction, he should never allow the patient to leave without examining the adjacent teeth for caries. As it is

sometimes months before the patient returns to the general practitioner, the exodontist owes an obligation to both the patient and the general practitioner to suggest at least that he return to his dentist for examination.

To the question, "If the exodontist sees faulty dental work in the mouth should he mention it to the patient?" 197 answered "Yes," 227 answered "No," and 86 answered "Inform the dentist." Although a large number answered "Yes," and gave good logical reasons such as: "It is for the patient's welfare"; "Another health measure"; "It raises the standard of dentistry"; and "Follow the golden rule"; a safer and saner method would be to inform the general practitioner and ask the patient to return to his dentist for a check up. That may seem contrary to the entire plea of this paper, which is to observe strictly our obligation to the patient, but as the majority answered "No" and gave such reasons as: "It is none of his business"; "It is out of his field"; "It is a reflection upon the general practitioner," and "The exodontist does not know the conditions under which the work was done," it would no doubt accomplish the same result; namely, the correction of the fault by informing the referring dentist. If he is the type of man whose support the exodontist desires, he will welcome any constructive suggestion. Certainly, the fear of losing the patronage of the general practitioner should never prevent the exodontist from considering the patient's welfare. It takes only a few moments to talk over a case; whereas, if the patient is told to carry the message, he generally tells an altogether different story. In most cases, trouble has arisen when the patient has attempted to relay what the other man has said.

No honest general practitioner or exodontist would maliciously malign the other. Therefore, each should communicate immediately with the other and most differences would be peacefully settled. If a man be capable of rendering a superior service, we should hasten to grant him our cooperation, which is responsible for the satisfactory consummation of any undertaking; whereas lack of cooperation is responsible for most of the misunderstanding and enmity that exists in the world today. Accepting as we should our calling to serve the public to the best of our ability, we should fraternize more. We should look for the good instead of the bad in each other. We should help shoulder each other's difficulties, instead of each considering the other as a competitor. We should adhere rigidly to the golden rule and lend a helping hand as occasions arise. We should learn to see the other man's point of view. We should cast aside petty jealousy and keep constantly in mind the patient's welfare. All these are necessary to the elevation of the profession. They are requisite to making this world a better place in which to live. They are part of the bond that ties us together. Remember "this above all else, to thine own self be true, and it must follow as the night the day, thou canst not then be false to any man."

VALUABLE LABORATORY PROCEDURES IN DENTISTRY*

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THE purposes of this paper are: (1) to call to the attention of the dentist the value of pathologic laboratory procedures in his professional work; (2) to emphasize the importance of these procedures in the diagnosis of pathologic disturbances which manifest themselves in the mouth, and (3) to point out and discuss the laboratory procedures indicated in the various more important conditions encountered. Discussion will be confined to the indications for and the interpretations of these procedures. No attempt will be made to give details of technic.

Even in this modern era of dentistry, laboratory procedures, roentgen-ray examinations excepted, are among the most neglected phases of dental diagnosis. While we admit that the roentgen rays are among the greatest diagnostic aids in dentistry (as well as in medicine), they should not be used as a panacea in the diagnosis of all oral disease. Many modern dentists feel that if they have a roentgen-ray study made, they have exhausted scientific resources in diagnosis. Far from that, they have simply given the patient the benefit of one special branch of dental science which is limited in its scope. Few dentists take advantage of the help that might be theirs in establishing a diagnosis if only they would intelligently employ clinical pathologic laboratory procedures more often; for example, biopsy, blood and spinal fluid examination, urinalysis, bacteriologic smears and cultures, and gastric analysis.

The literature on the subject of the application of laboratory procedures to dentistry is meager, and aside from a few articles that stress the importance of utilizing these tests or examinations, and some reports of fatal cases of leukemia that come before the dentist, we know of no attempt that has been made to point out the laboratory procedures indicated in cases with certain definite oral lesions. McGehee[1] emphasized the importance of laboratory procedures in dentistry as follows: "For patients suffering with dental periclasia, as well as for those affected with disturbances of a vague nature it is important that . . . blood, salivary and urinary tests, pathological, bacteriological, serological, immunological, and toxicological analyses be made."

The lack of enthusiasm regarding this branch of dental diagnosis is largely due to the failure of dental schools to give satisfactory instruction in the application of clinical laboratory examinations. This state of affairs should not exist today, and all students should be taught the indica-

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*Prepared on the occasion of the one hundredth anniversary of New York University.

1. McGehee, W. H. O.: Diagnosis of Disturbances of Oral Cavity, D. Cosmos, 68:1033 (Nov.) 1926.

tions for and interpretation of the most common methods used in clinical pathology.

There follows a brief discussion of the more important diseases which have oral manifestations and an evaluation of the laboratory procedures indicated in each case.

DIABETES MELLITUS

Diabetes mellitus is a common disease of metabolism with which oral manifestations are frequently associated. It is a disease in which there is impairment of the carbohydrate metabolism and which usually manifests itself by an increase of sugar in the blood and the presence of sugar in the urine, associated with polydipsia and polyuria. Its symptoms and manifestations are manifold and diverse, and the oral cavity is not untouched.

Thirst and dryness of the mouth are two of the outstanding subjective symptoms. Fissured tongue, swelling of the tongue, stomatitis, gingivitis, bleeding gums, periodontitis, pyorrhea alveolaris, caries and acid saliva are the more important pathologic conditions that may be seen in the mouth of a diabetic. Klug and Neuman[2] working independently have found that 90 per cent of diabetics have pyorrhea. It is obvious that the treatment of any of the foregoing conditions must necessarily be different if, on the one hand, diabetes is the etiologic factor and, on the other, some other (or unknown) condition is responsible.

The laboratory diagnosis of diabetes depends essentially on the examinations of urine and blood.[3] "The disease usually begins insidiously and its prompt detection depends upon the routine examination of the urine of all patients, rather than upon the examination of patients who present symptoms of the disease." Normally, a urine is sugar free by common tests, such as Fehling's and Benedict's. In a diabetic, we find, as a rule, sugar in the urine (glycosuria) in varying amounts. The persistent presence of sugar in the urine can usually be taken as evidence of the presence of diabetes. In fact, all cases that show glucose in the urine should be so considered until proved otherwise. While occasionally excessive intake of carbohydrate in a healthy person may result in glycosuria, a regulation of diet and further urine examinations will help establish a diagnosis. The specific gravity, instead of being around 1020, may be higher, often 1040, and in severe cases or in impending or actual diabetic coma, acetone and diacetic acid are found in urine. Usually, the diabetic shows a marked increase over the normal in the amount of urine eliminated (polyuria).

In the normal blood on a fasting stomach, sugar is present in amounts ranging from 60 to 130 mg. per hundred cubic centimeters. More than this is usually considered pathologic (hyperglycemia), and this is practically a constant finding in true diabetes mellitus. While the presence of sugar in the urine and an increase to above 130 mg. in the blood are indicative of diabetes, deviation from the normal "sugar tolerance curve" is a common early finding in this disease.

NEPHRITIS

Although almost equally objectionable, the terms "nephritis" and "Bright's disease," are so ingrained in the literature and firmly entrenched in the minds of the dental profession that we feel justified in using them. They represent an extremely frequent group of conditions

2. Klug and Neuman, in Moorehead, F. B., and Dewey, Kaethe W.: Pathology of Mouth, Philadelphia: W. B. Saunders Company, 1925, p. 210.

3. Joslin, E. P.: Treatment of Diabetes Mellitus, Ed. 3, Philadelphia: Lea & Febiger, 1923, p. 335.

associated with kidney disease, the extra-oral clinical manifestations of which are so numerous and varied that we will make no attempt to mention them. While there may be many oral lesions associated with nephritis, the most important and usual are ulcerative stomatitis, pyorrhea, edema of the uvula or fauces and dryness of the tongue.

The laboratory procedures usually of value in such cases are urine and blood examinations.

Urine. — Pathologic variations in amount and changes in specific gravity are easily detected. The urine should be tested for albumin. The number and variety of casts should be recorded. The presence and number of red or white cells should be a part of the record.

Special function test with phenolsulphonephthalein, the so-called "red test," to determine permeability or eliminatory power of the kidneys may be exceedingly valuable.

Blood.—The most important and valuable blood examinations in nephritis have to do with abnormal retention of certain elements, particularly nonprotein nitrogen or urea nitrogen, creatinine and uric acid.

Secondary anemia may be an associated condition.

SYPHILIS

As syphilis is responsible either directly or indirectly for many and varied conditions in medicine, its importance in dentistry is of necessity tremendous. Space will permit us to speak but briefly of its oral manifestations and the various labortory procedures of value. Syphilis is an infectious disease, caused by *Spirochaeta pallida.* Its lesions are widespread and diverse. For the sake of brevity, the most important oral syphilitic lesions can be classified as follows:

Acquired:
- Primary stage:
  - Chancre.
  - Associated lymphadenitis.
- Secondary stage:
  - Mucous patches; adenopathy.
  - Angina.
  - Diffuse glossitis.
- Tertiary stage:
  - Gumma.
  - Diffuse interstitial infiltration of tongue.
  - Smooth atrophy of tongue.
  - Spontaneous falling out of teeth.
  - Atrophy of alveolar process.
  - Necrosis of the jaw.
  - Naso-oral fistula.
  - Perforating ulcers.
  - Paresthesia.
  - Anesthesia.
  - Periostitis.
  - Spontaneous fracture.

Congenital
- Rhagades
- Gumma
- Hypoplasia (enamel especially)
- Disturbances of dentition
- Hutchinson's teeth

"Not only are the fundamentally acquired and congenital syphilitic lesions greatly misunderstood, but more so the laboratory procedures of aid in their diagnosis."[4] The associated methods, the material used and the interpretation of the results of the procedures are not given the consideration which they deserve. In this respect, let us consider dark-field illumination, the Wassermann test and biopsy.

Dark-Field Illumination. — The fact that this examination is for the presence of the causative agent of syphilis, *Spirochaeta pallida,* is not well enough understood. We must know that the chancre, mucous patches and gummas (all active syphilitic lesions) are the lesions most likely to harbor the organisms and that they should therefore be subjected to

4. Darlington, C. G.: Pathology Laboratory Examinations for Dentist, J. Lab. & Clin. Med., 13:376 (Jan.) 1928.

dark-field examination. Here, the necessity for wet material and the significance of a negative examination has not been sufficiently stressed.

Wassermann Examination.—The dentist's knowledge of the Wassermann test is largely confined to the blood Wassermann reaction, and, needless to say, his belief that a negative reaction means no syphilis while a positive (including the 1+ and the 2+ reaction) means syphilis, needs correction. Furthermore, his knowledge of relative agreement or disagreement of the Wassermann reaction in primary, secondary, tertiary and congenital syphilis can be improved. Let us summarize some general rules for interpretation:

Except in treated cases, only a 3+ or 4+ Wassermann reaction is to be regarded as positive.

A positive Wassermann reaction (leprosy and yaws excepted) indicates syphilis.

Spinal fluid Wassermann tests are often of value in neurosyphilis, when the blood Wassermann reaction is negative.

In chancre, the Wassermann reaction may be positive or negative. When the chancre has been present a short time, the reaction is more likely to be negative.

Secondary syphilitic lesions almost always give positive Wassermann reactions.

Clinical evidence of tertiary syphilitic lesions corresponds in 80 per cent of cases with the findings of the Wassermann test; in 20 per cent of cases clinical and Wassermann evidence does not agree.

Congenital lesions give negative Wassermann reactions very frequently, and so-called "inherited" lesions show negative Wassermann reactions even more frequently.

The Kahn serologic test is regarded by some authorities today as equal to the Wassermann in diagnostic value.

Biopsy in a given case may prove or disprove the presence of syphilis. Occasionally, it may reveal the presence of syphilis together with an associated lesion, as carcinoma or tuberculosis.

In suspected syphilitic bone conditions, roentgen-ray examinations are often of material aid in diagnosis.

TUMORS

In order to better indicate the value of laboratory aids in tumor diagnosis, we will first classify and briefly discuss the procedures, and then observe how these procedures apply to tumors of the mouth.

The three laboratory procedures of special value are: (1) roentgen-ray examination; (2) examination of pathologic tissue, and (3) bacteriologic and serologic procedures. A pathologic tissue examination can be made when indicated by preliminary excision of a small piece of the tumor, which is then subjected to microscopic study. This procedure is commonly known as a biopsy. "In many cases it is preferable, following the removal of the tumor in toto, to subject the whole tumor to complete pathological examination."[5] Bacteriologic and serologic examination includes smears, cultures, animal inoculation and complement fixation tests.

Tumors of the mouth and surrounding tissues can be divided or classified as follows in relation to the tests of choice.

1. In those tumors which are situated mainly within the mandible or maxilla, such as radicular cysts and granulomas, dentigerous cysts, adamantinomas, bone tumors and odontomas, the roentgen rays are indispensable, while pathologic tissue examination is the only method which will absolutely establish the diagnosis.

2. In epulides, angiomas, polypi, pa-

5. Darlington, C. G., and Corr, J. E.: Cancer of Mouth from Dental Standpoint, J.A.D.A., 16:2029-2045 (Nov.) 1929.

pillomas, salivary gland tumors and carcinomas, it is obvious that use of the roentgen rays applies only to exceptional cases in which bone is involved, while pathologic tissue examination is indicated in all cases.

3. In inflammatory tumors, pathologic tissue examination is the method of choice. Smears, cultures, serologic examination and animal inoculation should be made when indicated.

LEUKOPLAKIA BUCCALIS

Leukoplakia buccalis presents itself as white patches in the mouth, usually on the inside of the lip, on the mucous membrane of the cheeks, at the corners of the mouth and on the dorsum of the tongue. It is a chronic localized process occurring especially in male smokers, 50 years of age or over, who have bad teeth or are wearing ill-fitting plates and bridges. The tendency to classify it as a syphilitic lesion is often strong, owing no doubt to the frequent occurrence of leukoplakia in syphilitic patients. In patients with leukoplakia and a positive Wassermann reaction, the inference cannot always be drawn that the lesion is of syphilitic origin. These lesions may occur in patients who show no sign whatever of syphilis. Moorehead and Dewey[6] say "lues [syphilis] apparently only causes a certain predisposition to the disease." Recently, Ewing[7] and Bloodgood[8] have stated that tobacco is the most important etiologic factor.

Of far more importance than the relation of leukoplakia to syphilis is the relation of the former, especially the single thick lesion, to malignancy. While it is frequently said that a leukoplakia patch is a precancerous lesion, we believe that too much emphasis is given to this statement. "Precancerous" is a nebulous term at best and its usage leads to misunderstanding and confusion. While this is true, the value of a biopsy in leukoplakia is very great, as leukoplakia *per se* can sometimes be cured by nonsurgical measures; e. g., elimination of tobacco and the institution of oral hygiene. If the lesion has undergone definite malignant changes, the treatment is essentially different.

SCURVY

Scurvy is a vitamine B deficiency disease characterized by ecchymoses and petechiae of the skin, subperiosteal hemorrhages, swelling and ulceration of the gums and marked weakness. There may be present hemorrhagic stomatitis, acidity of the saliva, ulcerative or even gangrenous gingivitis, necrosis of the jaw, and sponginess of the gums, with falling out of the teeth, lesions possibly partially or largely dependent on the concomitant anemia. There are no specific laboratory tests, but a blood count for anemia may be of value and tests for the bleeding and coagulation time are definitely indicated. A roentgenogram of the jaw and of the long bones may be an additional aid to diagnosis.

GOUT

Gout is a disease which is fundamentally a disturbance of uric acid metabolism. Pyorrhea is often associated with it and there may be calcium or "gouty" deposits on the teeth. Blood chemical examination for increased uric acid is definitely indicated. The patient may show an anemia. Laboratory procedures for the detection of this condition are consid-

6. Moorehead, F. B., and Dewey, Kaethe W.: Pathology of Mouth, Philadelphia: W. B. Saunders Company, 1925, p. 188.

7. Ewing, James: Prevention of Cancer, Surg. Gynec. & Obst., 44:165 (suppl.) (May) 1927.

8. Bloodgood, J. C.: Oral Lesions Due to Vincent's Angina, J.A.M.A., 88:1142 (April 9) 1927.

ered in the section devoted to secondary anemia.

DIPHTHERIA

Diphtheria is a specific infectious disease more often found in children, and due to the Klebs-Loeffler bacillus. It is characterized locally by a fibrinomembranous exudate and by general toxic constitutional symptoms. Although the membrane of diphtheria is most often confined to the pharnyx and tonsils, it is not unusual for it to occur on the tongue or palate or in other locations in the mouth. Smears from diphtheric lesions are usually unsatisfactory unless positive, and, when negative, little significance can be attached thereto. The most reliable method for the diagnosis of diphtheria is a culture. By this method, fewer errors are likely to be made. From a prophylactic and therapeutic standpoint, the value of the Shick test and the administration of toxin-antitoxin should be thoroughly understood.

TUBERCULOSIS

Tuberculosis is an infectious disease caused by tubercle bacilli, the manifestations of which are usually chronic but may be acute. It most frequently affects the lungs (pulmonary tuberculosis), but not infrequently affects the lymph glands, serous membranes, bones or other parts and its lesions chiefly are those of necrosis and fibrosis. Though this disease infrequently manifests itself in the mouth, oral tuberculosis should by no means be considered a rare occurrence. Though it is uncommon, the fact that its recognition is of vast importance is self evident. Probably the most common tuberculosis lesion in the mouth is an ulcer. It usually begins as a nodule of tuberculous infiltration, which finally breaks down to form the ulcer. Its occurrence is more frequent on the tongue than elsewhere in the mouth. Tuberculous osteomyelitis may occur, with the subsequent formation of fistulas and sinuses. Lupus vulgaris, a chronic skin tuberculosis, may, rarely, involve the mouth by extension.

Tuberculosis of the mouth is usually seen only in cases of advanced tuberculosis of the lungs, with or without laryngeal tuberculosis, and is therefore secondary, primary tuberculous infection of the mouth being exceedingly rare.[9] It is interesting to note that few cases even with markedly advanced pulmonary tuberculosis develop oral lesions in spite of the fact that, in these cases, the sputum may contain innumerable tubercle bacilli over an extended period of time.

The diagnosis of tuberculosis of the mouth presents many difficulties. Scrapings from the lesions only infrequently yield the organisms, but when they do, the procedure is of great value. The inoculation of guinea-pigs with material from the suspected lesion when positive is of value. Recently, with improved technical methods, cultures have shown great promise. Biopsy is probably the best and most reliable single method. Probably all methods mentioned should be used, it being borne in mind that a positive finding is of greater value than a negative one. It is not rare for carcinoma to be associated with tuberculosis of the mouth. Of all the foregoing methods, the biopsy alone will reveal such association. In some cases of tuberculosis, anemia is a characteristic feature, and it may produce changes in the mouth. These changes and the indicated laboratory procedures are covered under "anemia."

ACTINOMYCOSIS

Actinomycosis, a chronic disease not frequently found in man, is caused by the

9. Finney, J. M. T., and J. M. T., Jr.: Tuberculosis of Tongue, Surg. Gynec. & Obst., 40:743-753 (June) 1925.

ray fungus or *Streptothrix actinomyces*. The common oral lesion is a chronic enlargement of the jaw (lumpy jaw). Nodules may appear on the tongue. Fistulas with pus discharging from them are occasionally seen. The diagnosis rests almost entirely upon the presence of the ray fungus. The fungus may be demonstrated either in smears from the pus or by biopsy of tissue taken directly from the lesions. Roentgen-ray examination may be of assistance, particularly in differential diagnosis. The fungus is said to be found occasionally in carious teeth of people with the disease, but it is questionable whether this fungus is found in healthy mouths.

SPOROTRICHOSIS AND BLASTOMYCOSIS

Sporotrichosis and blastomycosis, both rare diseases, may occasionally be evidenced as nodules or ulcers in the mouth. Biopsy will often show a characteristic microscopic picture, revealing the causative agent, although, on occasion, the diagnosis may be made by smear or culture demonstration of the fungi of the respective groups.

GINGIVITIS AND STOMATITIS

The more classic types of gingivitis and stomatitis are: catarrhal, herpetic, ulcerative (Vincent's, phagedenic), aphthous, parasitic, gangrenous (noma), hemorrhagic, metallic, lead (saturnina, plumbism), mercury (mercurialism) and radium.

The etiologic agents for the foregoing are so many and varied that the diagnostic laboratory aids will be numerous and diverse. We will consider only those conditions in which laboratory procedures are valuable.

VINCENT'S INFECTION

Vincent's infection is also called "trench mouth" and ulceromembranous and phagedenic gingivitis. These terms allude to the clinical or special manifestations of the process, and no further comment in respect to this seems necessary.

From a diagnostic standpoint, the following must be considered:

1. The so-called Vincent's organisms, spironema and fusiform bacilli, are frequently found in mouths not the site of Vincent's infection.
2. In nearly all destructive and putrefactive processes, these organisms are commonly found in large numbers, together with many other organisms.
3. Considerable doubt exists as to the exact etiologic rôle of these organisms.
4. While cultural methods for diagnosis are, on account of their difficulties, impracticable, it has been suggested that the two organisms actually represent the same organism in a different period in its life cycle.
5. In keeping with the foregoing, it is of great value to bear in mind that, in the more acute cases, the spironema predominates and its presence is therefore much more diagnostic. The fusiform bacilli tend to predominate to the exclusion of other organisms in the more chronic and, incidentally, the more frequently encountered cases.
6. Last and most important, a smear will therefore show not only the presence of an appreciable number of such organisms but also definite evidence of a destructive process, as manifested by necrotic tissue and pus.

PARASITIC STOMATITIS (THRUSH)

Smears, preferably wet preparations, unstained, not infrequently reveal the thrush organism, *Oidium albicans*, in association with spores and squamous epithelium.

GANGRENOUS STOMATITIS (NOMA)

It is a question whether noma should be included in this paper, (1) because of its rarity and (2) because laboratory ex-

aminations in this condition are of questionable value.

Noma is a rapidly progressing gangrene of the cheek which may spread to involve the tongue, palate and deeper structures. In smears from the lesion, along with much necrotic débris, the fusiform bacillus and many other organisms are frequently found. This picture, because it is found in any putrefactive and destructive process, has relatively little diagnostic value. Streptococci are said to play a causative rôle and may be demonstrated in smears or cultures from the lesion if the case is seen early. A leukocytosis of the polymorphonuclear variety may be present and there may be a positive blood culture.

HEMORRHAGIC STOMATITIS

Hemorrhagic stomatitis or gingivitis, while less frequent than some of the other varieties, is more likely to be associated with scurvy, the more severe types of anemia, leukemia and purpura. The laboratory procedures for these conditions are considered under their respective headings.

METALLIC STOMATITIS

While various drugs or metals, such as lead, mercury, the iodides and radium products (especially mesothorium), may be responsible for lesions in the mouth, we shall consider only those in which laboratory procedures are of definite value.

Lead.—Blood examinations reveal secondary anemia of varying severity, and the more diagnostic and characteristic stippling of erythrocytes. In the more severe and exceptional case, lead may be recovered from the urine and feces.

Radium Products; Mesothorium.—An unusual but nevertheless important form of stomatitis, frequently associated with an osteitis, may arise in individuals suffering from radium poisoning. This was ably brought out by Martland, Conlin and Knef[10] in connection with the watch dial industry's use of illuminating paint.

Blood examination reveals, in fatal cases, a leukopenic regenerative anemia. Roentgen-ray examination is indicated where and whenever bone involvement is suspected, as in radium osteitis.

LUDWIG'S ANGINA

Deep cervical infection (Ludwig's angina) is a deep suppuration of the neck, due presumably to oral infection which sometimes develops with great rapidity. Within two or three days, the whole front or side of the neck may become swollen and brawny, while chills and fever show the gravity of the infection.

The infection may sometimes be traced to streptococci or other organisms, which attack the floor of the mouth or root of the tongue. Although suppuration is often a part of the picture, the spread of the infection may occur, with minimal production of pus, through the deeper structures of the mouth, throat and neck and cause extreme swelling of the tissues in the neighborhood. The proximity of important structures must be kept in mind; e.g., edema of the glottis may quickly embarrass respiration.

The laboratory procedures indicated are: (1) blood cultures; (2) blood counts for leukocytosis, and (3) smears and cultures from the lesion or lesions for the causative organism.

INFLAMMATION OF BONE (MANDIBLE OR MAXILLA)

Periostitis; Osteomyelitis; Osteitis.—Some of the causes of affections of these parts, such as syphilis (syphilitic periostitis), actinomycosis, tuberculosis and radium osteitis, have been discussed else-

10. Martland, H. S.; Conlon, P., and Knef, J. P.: Some Unrecognized Dangers in Use and Handling of Radioactive Substances, J.A.M.A., 85:1769 (Dec.) 1925.

where. Of those remaining, only the more common infecting cocci, i.e., staphylococci, streptococci and pneumococci, need to be considered. Manifestations vary between gross pus with marked destruction in the more acute cases and little or no pus and marked production in the more chronic cases.

The laboratory procedures indicated, arranged in their order of value, are: (1) the roentgen-ray examination, which has no competitor as a primary diagnostic aid in any or all bone conditions; (2) examination of the exudate (smears for organisms and type of exudate); (3) blood cultures and blood counts in the more severe pyogenic infections, and (4) pathologic tissue examination. While it may not be advisable to perform a biopsy for diagnostic purposes alone, if an operation is carried out and material is removed, such material should be subjected to examination.

DISEASES OF THE TEMPOROMANDIBULAR JOINT

1. *Acute Rheumatic Arthritis.*—Acute rheumatic fever is a generalized acute infectious disease characterized by an acute multiple arthritis, which rarely attacks the temporomandibular joint. The blood shows a leukocyte count around 12,000 per cubic millimeter of blood. The blood culture may be positive for streptococci. Secondary anemia may be marked.

2. *Gonorrheal Arthritis.*—Gonorrheal arthritis, an inflammation of the joint occurring during or following gonorrheal infection, is due to the presence of the gonococcus. The temporomandibular joint may be involved. Smears for the organism from the genito-urinary tract and from aspirated joint fluid and the complement fixation test for gonorrhea should be employed as aids in diagnosis.

3. *Acute Suppurative Arthritis.*—This is usually due to the presence of pyogenic organisms. It may occur in a variety of conditions. Here, the blood count will usually show a high leukocytosis. Blood cultures should be made when septicemia is suspected. Smears and cultures of the pus from the joint may reveal the causative organism.

4. *Tabetic Joint.*—The temporomandibular joint is infrequently involved in tertiary syphilis. Blood and spinal fluid Wassermann tests should be made. Even if the former is negative, the spinal fluid may give a positive Wassermann reaction.

5. *Traumatic Arthritis.*—In this form of arthritis, roentgen-ray examination is indicated.

FRACTURE OF MANDIBLE

It is evident that the ordinary traumatic fracture of the jaw requires no pathologic laboratory procedure other than the use of the roentgen rays for diagnostic purposes. With fractures occuring spontaneously, or where the causative trauma is so slight that it would be insufficient to cause a fracture in a healthy person, the picture is entirely different; i.e., pathologic fracture. In the latter type of fracture, unless the cause is evident from the history or physical examination, one should insist on a blood and spinal fluid examination for possible syphilis or perform a biopsy at the site of fracture for the presence of tumor. Syphilis and tumor are the most important causes of pathologic fractures.

NONUNION

The laboratory examinations which are of aid here are: (1) the Wassermann in syphilis; (2) urine and blood examination in diabetes (above); (3) urine and blood examination in nephritis (above), and (4) biopsy for tumor.

If, as is so often the case, the fracture is a compound one, and infection results, smears and cultures of the exudate may reveal the offending organism.

INFECTIONS IN AND AROUND THE TEETH

Pulpitis, periodontitis, periapical abscess and gingival abscess may be included under infections in and around the teeth.

The tendency today to study smears and cultures from these lesions is increasing. The causative organism may be demonstrated. Such knowledge may be of inestimable value in the respective conditions. The blood count in these conditions, unless the process is very acute, may reveal only a slight leukocytosis or lymphocytosis. Roentgen-ray examinations are indicated in all cases of this type.

PYORRHEA ALVEOLARIS, PERIODONTOCLASIA

Though the cause of pyorrhea is not thoroughly understood, diabetes, nephritis and gout are linked with it by many authors. The laboratory procedures indicated in each are given in the sections under these headings. The study of smears or cultures from the periodontium, while not ordinarily diagnostic, may on occasion be of value. Roentgen-ray examination may be a valuable adjunct.

ANEMIA

"Anemia" means an impoverishment of the blood, qualitatively, quantitatively or both. Obviously, quantitative variations can be accurately measured as a reduction in the amount of hemoglobin, a reduction in the total number of red cells or both. Anemia may be primary or secondary. The latter will be considered first on account of its frequency and easier comprehension.

Secondary Anemia.—An anemia is said to be secondary when a definite cause is obvious or easily discernible, as, for example, after hemorrhage or in association with malignant growths, starvation, acute infectious diseases such as typhoid fever or acute rheumatic fever, and chronic conditions; e.g., syphilis, tuberculosis and nephritis. While it has been claimed that, in children, caries is often a factor in the production of secondary anemia, in many cases it would seem that the caries is due to the anemia. Orally, a secondary anemia usually manifests itself by a paleness of the mucous membranes, especially of the lower lip, with a not infrequent stomatitis and gingivitis. Aside from the oral lesions, the importance of this form of anemia lies in the possibility that such a patient may be so anemic as to make any contemplated surgical procedure, with coincident loss of blood, hazardous; and, again, an anemic patient may, at the same time, tend to bleed excessively on slight provocation; a knowledge of which fact is of decided importance to both patient and dentist.

To determine the presence and degree of anemia, a red blood cell count and hemoglobin determination are indicated. Beginning at 5,000,000 red blood cells (in every cubic millimeter of blood) and 100 per cent hemoglobin as normal, either one or the other, or both, will diminish in direct proportion to the severity of the anemia. In secondary anemia, the decrease in the number of the red blood cells and in the hemoglobin is usually proportionate. In severe cases, nucleated red blood cells (normoblasts) are often thrown into the circulation.

Primary Anemia.—In contrast to secondary anemia, an anemia is said to be primary when no apparent cause is evident. Under this heading, there are two entities each with its own distinctive clinical and laboratory picture, i.e., chlorosis and primary progressive pernicious, or addisonian, anemia. While we accept this as a time honored division for the purpose of comparison, it must be admitted that the modern tendency is

to eliminate chlorosis from the primary group and classify it as a secondary anemia.

Chlorosis.—Chlorosis, formerly more common than at present, is an anemia occurring in young girls due fundamentally to a disturbance of iron metabolism. The condition is characterized by a marked relative diminution in hemoglobin, associated with symptoms and signs due to an anemia, and a characteristic greenish tint to the skin. The mouth may show pallor of the mucous membranes as in any anemia,[11] caries which may progress rapidly, softening of the dentin and enamel and a form of gingivitis that is associated with the deposition of calculi on the teeth. There is also a marked predisposition to pyorrhea alveolaris in this disease.

The blood picture is characteristic, and usually a definite diagnosis may be made by such an examination. There is a reduction in the hemoglobin and also in the red blood cells, but the decrease in hemoglobin in contrast to that seen in secondary anemia is proportionately far greater than the decrease in the number of red cells, resulting in a color index below one. The erythrocytes are frequently smaller than normal (microcytes) and show a central pallor, giving them the name "pessary cells."

Primary Progressive Pernicious (Addisonian) Anemia.—This is a disease of unknown etiology, usually showing a distinctive blood picture which results from hemolysis and improper hematogenesis. The brilliant results of liver therapy have revolutionized the treatment of the disease. It is not so uncommon as was formerly believed and its hitherto inevitably fatal outcome must still be borne in mind. A paleness of the mucous membranes may be the only sign in the mouth, but more important oral manifestations are petechial hemorrhage in the lining of the mouth, bleeding of the gums and glossitis. Osler[12] states that "pyorrhea alveolaris may be said to be present in all cases." The patient may complain of sore mouth (and this may be the first symptom of the disease); examination revealing either a simple or an ulcerative glossitis or a general stomatitis.

The blood picture is usually diagnostic. One of its striking features is a great diminution in the number of red blood cells, it often falling as low as 1,000,000; the average count in Osler's series of eighty-one cases[13] being 1,575,000 per cubic millimeter. The hemoglobin is reduced, but not in proportion to the decrease in the number of red blood cells; i.e., it is relatively high. This results in a color index above one. The red cells themselves are often very large (macrocytes) but many are small (microcytes); and either may take on irregular shapes (poikilocytosis) or sizes (anisocytosis) other than the normal round or ovoid discs. Stippling of the red cells with a bluish discoloration (polychromatophilia) is common. A few nucleated red cells of normal size (normoblasts) or of large size (megaloblasts) may be found.

Although this blood picture is typical of primary progressive pernicious anemia, it must be borne in mind that similar findings may be seen in severe secondary anemia. The presence of macrocytes is most important from a diagnostic standpoint.

The gastric analysis usually shows an achlorhydria (absence of free hydrochloric acid).

11. Footnote 6, p. 140.

12. Osler, William: Principles and Practice of Medicine, Ed. 8, New York: D. Appleton & Company, 1918, p. 736.

13. Footnote 12, p. 737.

Hemophilia.—This is an hereditary disease found only in males, although transmitted through the female, and characterized by a marked tendency to bleed. The importance of a thorough understanding of this condition to the dentist is self evident, especially when the fact is considered that tooth extraction is one of the commonest causes of hemorrhage in these individuals, in some instances ending fatally. In the mouth, nontraumatic bleeding from the gums may be observed, and this may be a diagnostic sign.

For differential diagnosis, the coagulation and the bleeding time should be determined. The coagulation time is greatly lengthened and the clot is firm and retractile, while, paradoxically, the bleeding time is normal.

THROMBOCYTOPENIC PURPURA

Summed up briefly, this condition is characterized by Whipple[14] as showing the following symptoms: (1) bleeding from the nose and gums, and into the skin; (2) an increase in the size of the spleen; (3) a decrease in the number of blood platelets; (4) an increase in the bleeding time; (5) a normal clotting time; (6) slow retraction of the clot and (7) secondary anemia.

The importance of this disease in dentistry is self-evident. The laboratory procedures play an important rôle in the diagnosis of this form of purpura and those suggested by the foregoing are: (1) blood platelet count; (2) bleeding and coagulation time and (3) a blood count (for secondary anemia).

LEUKEMIA

Leukemia is a disease of unknown etiology "characterized by a permanent increase in the leucocytes of the blood, associated with hyperplasia of the leucoblastic tissue."[15] The outcome is usually fatal, the acute cases terminating within from three to four months, the chronic often continuing for years. Ulcerative lesions of the mouth, especially of the gums, with bleeding, suppuration and gangrene, have been described in the literature. Lymphatic hyperplasia of the tongue and tonsils may occur. Ulcerative gingivitis and subsequent loosening of the teeth are looked on too often by dentists as sufficient indication for extraction, without further study. Disastrous results may ensue. Isaacs[16] speaks of five or six cases in which teeth were extracted in leukemic patients and which resulted fatally within a few days. His contention is that these were chronic cases that were precipitated into acute ones by the extraction. There is no gainsaying that, in leukemia, operations of any nature are best deferred. Leukemia, on the basis of both clinical manifestations and the blood picture, is divided into two groups: splenomyelogenous and lymphatic.

Splenomyelogenous Leukemia. — In this condition, a striking feature of the blood picture is the permanent and high increase in the leukocyte count, which often may reach 750,000 per cubic millimeter. The characteristic feature of the disease is the relatively large numbers of myelocytes in association with this enormous increase in the total leukocyte count. Myelocytes may represent 30, 40 or even 50 per cent of all the leukocytes present. It should be clear that the increase is among cells of the granular series.

Lymphatic Leukemia.—In this form of leukemia, there is also a marked increase in the number of leukocytes, but

14. Whipple, A. O.: Splenectomy in Certain Types of Purpura. (Unpublished data.)

15. Footnote 12, p. 741.

16. Isaacs, H. J.: Acute Lymphatic Leukemia Relative to Minor Surgical Procedures, D. Cosmos, 67:953 (Oct.) 1925.

the counts are usually not so high as in the splenomyelogenous variety. The increase here is of cells of the nongranular series, the lymphoblast or lymphocyte, these cells often making up 99 per cent of the differential count. Polymorphonuclear neutrophiles are correspondingly diminished.

The laboratory procedures indicated are as follows: (1) blood count and differential stain in a typical case, which will afford a diagnosis as well as indicating the variety of leukemia; (2) determination of the grade of anemia as, in both forms, varying grades are met; (3) in all types of anemic and leukemic patients, the determination of bleeding and coagulation time, and (4) biopsy since a reasonably correct surmise that leukemia is present may often be made on biopsy material from the lesion in the mouth or elsewhere.

AGRANULOCYTIC ANGINA

Considerable interest and attention have been devoted of late to agranulocytic angina. The disease is associated with a marked leukopenia. Striking manifestations are commonly seen in the throat, including ulceronecrotic lesions of the tonsils, gums, fauces and nasopharynx. The main characteristic of the blood picture is a severe leukopenia with an extraordinary disappearance of polymorphonuclear leukocytes (granulocytes) from the circulating blood.[17]

Most of the cases are fatal. Here, it is probable that the lesions in the mouth are secondary to a pathologic condition of the bone marrow which generally implies lack of resistance to infection. Other cases (few in number) are relatively benign. Here, it is probable that oral lesions are primary, with some inhibitive or toxic action on the bone marrow.

17. Rosenthal, N.: Hematological Aspects of Agranulocytosis and Other Diseases Accompanied by Extreme Leucopenia, Am. J. Clin. Path., 1:7-32 (Jan.) 1931.

LABORATORY PROCEDURES

1. Smears of oral lesions should be taken. The stained films often reveal a picture similar to that seen in Vincent's infection.

2. Careful daily examination of the blood is definitely indicated for detection of a leukopenia. The differential count in these cases shows a marked decrease in polymorphonuclears, with a relative or absolute increase in number of cells of the nongranular series.

ADDISON'S DISEASE

Addison's disease is an infrequent condition characterized by marked asthenia, anemia, low blood pressure and discoloration of the skin and mucous membrane, associated with a pathologic process in the suprarenal glands or ganglions. It is of interest and is important because it produces a patchy brown discoloration of the oral mucous membrane. The associated secondary anemia, which is a constant factor, may show oral lesions previously mentioned under "anemia." The laboratory procedures indicated are those given above for secondary anemia.

FOCAL INFECTION

No attempt is made to exhaust the subject of focal infection and the part it plays in the causation of disease. It is widely accepted that the oral cavity, perhaps more than any other part of the body, is frequently the site of one or more localized areas of latent or active infection that are commonly termed "foci." It must be admitted that, at times, such foci are or may become responsible for a number of classic syndromes, such as arthritis, endocarditis, myositis, lumbago, and neuritis. The

claim that these foci are always linked with such conditions as cause is to effect needs revision. The lesions frequently cited, many times without justification, are apical abscess, granuloma and cyst.

In discussing laboratory procedures in these cases, we are confronted with an unusual situation, no hard and fast rules applying because each case is a complete medicodental study in itself. Therefore, in focal infection and its varied manifestations, a complete and thorough understanding of all laboratory procedures is essential.

We will enumerate several tests which may be of value: roentgen-ray examination, smears, cultures, vaccines and skin sensitization tests, blood counts, cultures and complement fixation tests, occasionally urinalyses, and rarely, animal inoculation. One's experience will alone be the guide as to selection of tests. The correct interpretation of their results is linked intimately with a consideration of the patient's history and a thorough physical examination.

COMMENT

This article is not intended as an exhaustive treatise on clinical laboratory diagnosis for the dentist.

Wider knowledge of laboratory procedures and their interpretation is invaluable to the dentist in the diagnosis, and particularly the differential diagnosis, of diseases which manifest themselves in the mouth.

We have taken the liberty of omitting certain oral lesions such as caries and anomalies, because laboratory procedures in these conditions are of questionable value.

Instruction in clinical pathology should be included in the curriculums of all dental schools. Sufficient instruction in technic should be given that the proper methods of securing specimens shall be thoroughly understood.

As a minimum, such a course should include a knowledge of the principles underlying the more frequently used tests and their indications and interpretation.

SELECTIVE INCISAL GUIDANCE IN FULL DENTURE CONSTRUCTION*

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IN clinic and class work the question is often asked, "What determines the inclination of incisal guidance?" This paper will be devoted primarily to a consideration of this particular subject.

The arrangement of anterior teeth in full denture construction must of necessity fulfil many requirements, if the completed dentures are to be classed as successful by the patient and by the operator.

During the period of tooth arrangement and trial in the mouth, the problem of satisfying the esthetic and the phonetic requirements must be met. Together with these requirements, the mechanical

*Read before the Section on Full Denture Prosthesis at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

problems arising from anterior tooth arrangement must also be considered.

Many instructive articles pertaining to esthetics in full denture construction have been published, and a paper by W. H. Wright, of Pittsburgh, entitled, "Simplified Phonetic Tests for Use in Prosthetic Restorations," is a masterpiece on the subject of phonetics.[1] (Fig. 1.)

There is no reason that every denture should not have an anterior tooth arrangement which meets the individual esthetic and phonetic requirements of the patient; together with balanced occlusion, which is essential to the continued success of dentures.

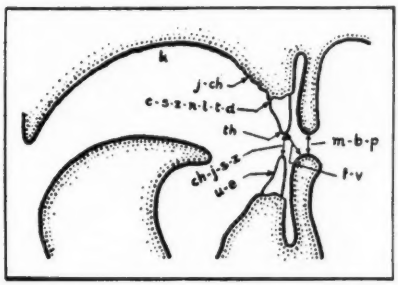


Fig. 1.—Diagram of value in phonetic tests. (After Wright.)

Some authors have seen fit to sacrifice the esthetic in favor of the assumed mechanical requirements of balanced occlusion; while others disregard the importance of balanced occlusion in favor of esthetics or other requirements.

Neither extreme is necessary, if the operator will acquaint himself with incisal guidance as a factor in balanced occlusion and establish the posterior tooth form and arrangement which best meet the requirements of each individual case.

There are many factors in the arrangement of artificial teeth in balanced occlusion, among them: (1) condylar guidance, (2) incisal guidance, (3) cusp height, (4) the compensating curve and (5) the plane of orientation. For convenience and clarification, let us assume all other factors as remaining unchanged when discussing the influence of one single factor upon another.

Incisal guidance is one of the important factors referred to. Throughout this paper, it is to be understood, when it is stated that incisal guidance is influenced by, or exerts an influence on, any other one factor, that all other factors are to be considered as invariable. For example, in considering the influence of varying incisal guidance inclinations on cusp height, it is assumed that

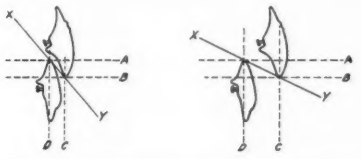


Fig. 2.—*D-C*, overjet; *A-B*, overbite; *X-Y*, incisal guidance inclination, as referred to the base line. On the left, the incisal guidance is steeper than on the right. In both figures, the vertical overbite remains the same, but the greater overjet on the right results in a flatter incisal guidance.

the degree of opening, condylar guidance, compensating curves, the plane of orientation and all other factors are to be considered as fixed.

As a premise to the content of this paper, it is to be understood, unless otherwise stated, that the degree of opening, together with condylar indications, is to be accepted as having been established by records taken from the patient, and therefore no longer variable or entering into the discussion.

Another premise is that incisal guid-

1. Dental Engineering, Buffalo: Hanau Engineering Company, 1926.

ance, from a practical standpoint, is entirely within the control of the operator and should be established through the arrangement of the anterior teeth to meet the requirements of esthetics and phonetics for the individual case.

It is recognized that flat incisal guidance like flat condylar guidance is more conducive to denture stability than steep guidance and therefore, while establishing the desired esthetics and phonetics, those combinations of overbite and overjet which will result in the flattest possible incisal guidance should be incorporated into the anterior tooth arrangement.

Overjet is the relation of the maxillary to the mandibular anterior teeth in a horizontal plane. Deep overjets are usually conducive to denture stability, in that they result in flatter and therefore more favorable incisal guidance inclinations. (Fig. 2.)

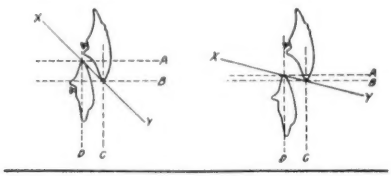


Fig. 3.—*D-C*, overjet. This is the same in both figures, but the flatter guidance *X-Y* on the right results from the lesser degree of vertical overbite *A-B*.

Overbite is the relation of the maxillary to the mandibular anterior teeth in a vertical plane. (Fig. 3.)

As stated in a previous paper,[2] neither esthetics nor phonetics requires the deep vertical overbite so often found in artificial dentures. This could well be worded: neither esthetics nor phonetics requires the steep incisal guidance so often found in artificial dentures. Fortunately, it is not the vertical overbite alone that influences the angulation of this guidance. The absence of sufficient overjet is usually more to blame for steep incisal guidance in full dentures than is the overbite. (Fig. 4.)

It might be said, then, that the principal inclinations of incisal guidance are determined by the combination of overjet and overbite established in the setup.

INFLUENCE OF PREDETERMINED TOOTH FORM AND ARRANGEMENT

It is not necessary and seldom advisable to permit incisal guidance to be influenced by posterior tooth form or predetermined compensating curvatures for the reason that esthetic and phonetic values are often unfavorably influenced by such procedure.

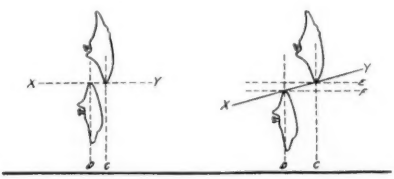


Fig. 4.—Left: Flat incisal guidance associated with horizontal overbite *D-C* and absence of vertical overbite. Right: What has been termed minus incisal guidance. (This arrangement has seldom been found satisfactory by the author.)

Some authors prescribe technics or recommend procedures whereby these factors are predetermined and, as a result, the dentist is too often handicapped in his effort to produce the desired combinations of esthetic values and balanced occlusion. An example of this is found in a paper presented by M. M. Schwartz entitled, "Some Important

2. Jordan, L. G.: General Practitioner and Full Denture Problems, J. A. D. A., 16:1379 (Aug.) 1929.

Considerations in Tooth Arrangement,"[3] in which he described a method establishing the inclination of incisal guidance in advance of tooth arrangement. (Fig. 5.) The results of this method have been observed in a great number of cases and found unsatisfactory. If cuspless or semicuspless posterior tooth forms are to be used in the presence of steep condylar indications, this method may be resorted to, if the operator wishes to keep the mandibular posterior teeth close to the mandibular ridge and avoid an excessive prominence of compensating curve.

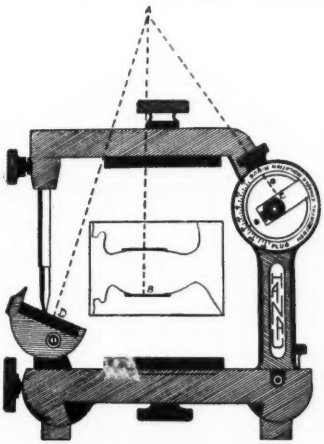


Fig. 5.—Technic recommended by M. M. Schwartz, one perpendicular being erected from condylar guidance inclination, another from first molar region on crest of lower ridge. At the intersection of these lines, another line is drawn to the incisal guide and the incisal guide adjusted at right angles to this line.

I do not favor this method of procedure and do not use it in my practice, for two reasons in particular: (1) the esthetic results are often very unsatisfactory, usually because the maxillary anterior teeth do not show sufficiently, and (2) I do not limit myself to the use of any one particular posterior tooth form. (Fig. 6.)

There are many other technics as unsatisfactory as the one just mentioned, for the reason that certain important factors are determined in advance of determining the requirements of the individual case and the operator is thereby unnecessarily handicapped.

INFLUENCE OF CONDYLAR GUIDANCE

Provided the operator does not limit himself to the use of any one posterior tooth form, compensating curve or posterior tooth position, incisal guidance is but slightly influenced by condylar guidance. If the operator decides in advance on one definite posterior tooth form and on the tooth alinement to be used, the inclination of condylar guidance, together with the other established facts, will exert a marked influence on incisal guidance.

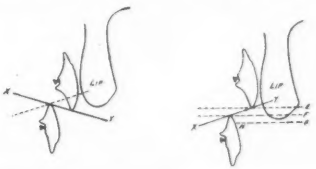


Fig. 6.—Use of minus incisal guidance inclinations, often resulting in failure to meet esthetic requirements, as demonstrated by figure on right. In this case, the upper central incisor should be placed downward at least to *G*. Such a change will result in an increased inclination of incisal guidance as demonstrated by the figure on the left. Predetermination of tooth form, arrangement, etc., based on the original anterior arrangement (right) will, of course, have to be considerably altered to meet the new requirements (left).

If we are to limit ourselves in all cases

3. Schwartz, M. M.: J.A.D.A., 16:606 (April) 1929.

to any one posterior tooth form or posterior tooth alinement, it is essential to give special consideration to the relation existing between incisal guidance and condylar guidance. For example, if we were to use anatomic posterior tooth forms presenting cusp inclinations of 30 degrees without alteration and place these teeth in their usual positions on a case presenting flat condylar indications, it would be found necessary to establish steep anterior-posterior and lateral incisal guidance. Such an anterior tooth arrangement might not be acceptable from the point of view of esthetics and certainly would not increase denture stability. To avoid this undesirable incisal guidance in this specific case, I would select posterior tooth forms with flatter cusps.

Again, if posterior tooth forms with flat occlusal surfaces were selected for use in a case presenting 30 degree condylar indications, it would be found necessary to establish a flat incisal guidance. This again may prove undesirable from the point of view of esthetics, yet it is unavoidable unless excessive prominence of the compensating curve is permitted. Lateral balance would be impossible in this particular case because the posterior tooth form selected does not present cusp inclinations to satisfy the lateral compensating curves.

Limiting ourselves in advance to any special tooth form or arrangement is an unnecessary handicap which makes its influence felt on the finished dentures. Mechanical problems are not the only ones which should be recognized in full denture construction.

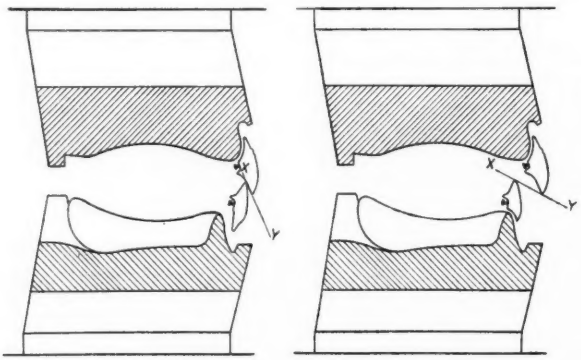


Fig. 7.—Left: Condition often found and which is detrimental from many angles. Right: Arrangement which will prove more satisfactory owing to flatter incisal guidance inclination, increased mandibular denture stability, enhanced esthetic values and lessened injury to supporting structures of both dentures resulting from shrinkage with attending decrease in degree of opening.

INCISAL GUIDANCE IN RELATION TO DENTURE STABILITY

From the standpoint of stability, full dentures are more satisfactory when the teeth are placed over the crest of the ridge. This is particularly true in the anterior region of the mandibular denture. Most of the absorption of the ridges in the anterior region takes place at the expense of the labial plate and crest of the ridge, resulting in a distal drift of the crest of the ridge. Many cases present an anterior maxillary ridge

crest that has drifted to a point somewhat distad from the original natural tooth positions. This is evidenced by the surface contour of the soft tissues covering the process.

Because of the stability of the maxillary denture base, the maxillary anterior teeth may be placed somewhat labially from the crest of the ridge in a position originally occupied by the natural teeth. Esthetic requirements are usually satisfied by such an arrangement.

If this procedure is attempted in mandibular tooth arrangement, the dislodging leverages created greatly disturb the stability of the much to be favored mandibular denture base, and also destroy the natural facial contour in the region of the lower lip and chin.

In a paper previously presented, I said[2]:

> The common practice of setting the mandibular anterior teeth labially from the crest of the ridge for the purpose of bringing about contact between the maxillary and mandibular anterior teeth is positively wrong and accounts for many of the facial deformities which are so prevalent among denture patients. (Fig. 7.) This type of construction often destroys phonetics as well as the possible stability of the mandibular denture base.

The number of dentures which are constructed in this manner is much greater than one would expect. Such a tooth arrangement results in inclinations of incisal guidance that are far steeper than is necessary or advisable.

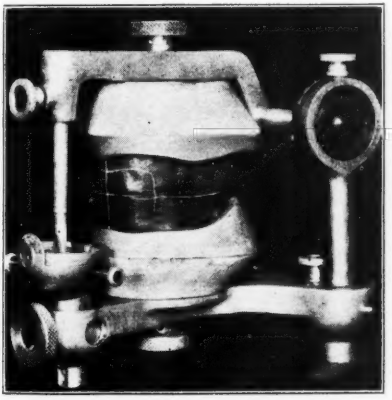


Fig. 8.—Casts mounted on the articulator with occlusal rims representing correct degree of opening and markings which furnish data pertaining to anterior tooth dimensions. The condyle guides have been adjusted from the records made on the patient and the incisal pin has been locked to retain the degree of opening. The next step in accordance with the author's technic consists of arrangement and the trying in of the anterior teeth.

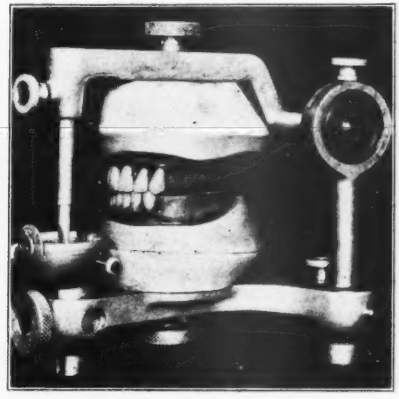


Fig. 9.—Case showing occlusal rims left intact in posterior and anterior teeth tentatively arranged for trying in.

ESTABLISHING INCISAL GUIDANCE

So far, incisal guidance has been considered in a somewhat general manner. The actual procedure incident to establishing incisal guidance in a practical case is as follows:

The operator is not concerned with tooth arrangement until the correct degree of opening has been established in the mouth by the aid of occlusal rims, the maxillary and mandibular casts prop-

erly mounted on the articulator and the condylar guides adjusted in accordance with records made on the patient. (Fig. 8.) The problem of tooth arrangement now faces the operator and should be divided into two separate steps: (1) arrangement of the anterior teeth and (2) selection and arrangement of the posterior teeth.

The baseplates with occlusal rims used in establishing the degree of opening and making records on the patient are left intact. Measurements are taken from markings made on the anterior surfaces of the occlusal rims and, from these measurements, it is possible to determine the width and length of anterior teeth most suitable for the case in hand. The shade and type of anterior tooth form have already been determined in the presence of the patient.

The anterior teeth are then selected and tentatively arranged in consideration of esthetics and phonetics. The occlusal rims are left intact in the posterior region and contoured to simulate the future posterior teeth and preserve the original degree of opening.

The case is then tried in the mouth and altered to meet the requirements of esthetics and phonetics.

The operator will be greatly assisted in the phonetic problems arising in full denture construction if he will familiarize himself with the contents of the paper by Wright previously referred to.[1]

After the anterior tooth arrangement is completed, the trial dentures are returned to their casts on the articulator. (Fig. 9.) The incisal pin of the articulator is now locked in contact with the incisal guide to maintain the established degree of opening.

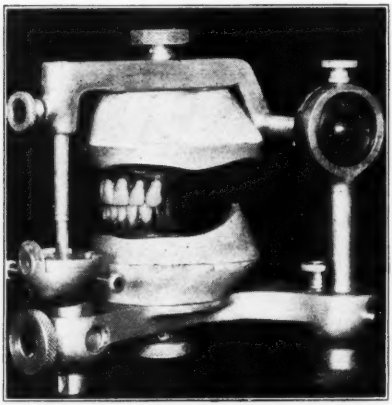


Fig. 10.—Appearance of case after trying in and final arrangement of anterior teeth, the remaining occlusal rims being removed and the case ready for adjustment of incisal guide. The incisal pin remains locked in its original position.

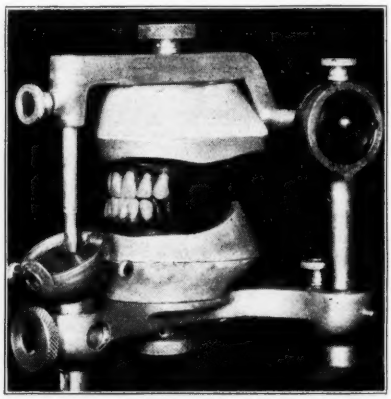


Fig. 11.—Anterior posterior adjustment. The teeth are brought into edge-to-edge relation and the guide tilted to make contact with the end of the incisal pin and then locked in this position.

In order that the anterior teeth may not be displaced during manipulation of the articulator, the incisal guide is now adjusted.

INCISAL GUIDE ADJUSTMENT

An incisal guide is that portion of the

articulator which is adjusted to furnish the mechanical equivalent of the guidance established through the arrangement of the anterior teeth. The incisal guide used provides adjustment for recording anterior-posterior as well as lateral incisal guidance. Its use merely prevents the displacement of the previously arranged anterior teeth and it is adjusted in the following manner:

The remaining portion of occlusal rims are removed from the baseplate. (Fig. 10.) The teeth are brought into incising or edge-to-edge relation. The incisal guide lock nut is loosened and the

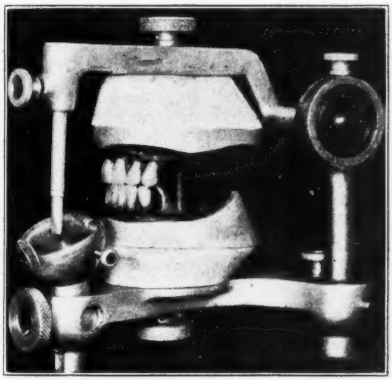


Fig. 12.—Lateral adjustment. The teeth are brought into lateral relation and the corresponding wing of the guide is tilted to make contact with the incisal pin. The opposite lateral adjustment is made in the same manner.

guide tilted, until it makes contact with the lower end of the incisal pin while the teeth are in contact. (Fig. 11.)

The guide is then locked in this position and the anterior-posterior incisal guidance which was established in the anterior tooth arrangement is thereby transferred to and recorded on the articulator.

To adjust the lateral inclinations, the maxillary member of the articulator is brought into lateral relation, permitting the anterior teeth to remain in contact.

While in this relation, the corresponding lateral wing of the incisal guide is raised to make contact with the lower end of the incisal pin. (Fig. 12.) The opposite side is adjusted in like manner and, when completed, the incisal guide has been adjusted to record the guidance created by the anterior tooth arrangement. (Fig. 13.)

This completes incisal guide adjustment in accordance with my own method.

Not all articulators are provided with incisal guides which allow such a wide range of adjustment. As the guide itself

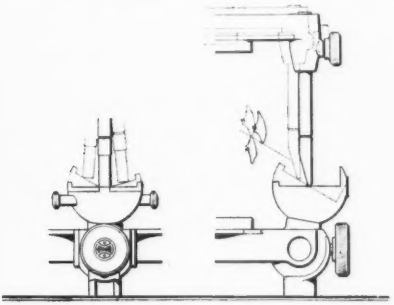


Fig. 13.—Lateral and anterior posterior incisal guide adjustment described in Figures 11 and 12.

merely serves to prevent displacement of the previously arranged teeth, the operator could dispense with its use by firmly securing the anterior teeth in hard wax, with care in articulator manipulation to prevent displacement.

The next step is that of selecting and arranging the posterior teeth in balanced occlusion. Posterior tooth forms and arrangements should be provided which, when properly coordinated with the three guidances, namely, right and left condyle paths and incisal guidance, will establish balanced occlusion.

The question: how does incisal guidance affect the form and arrangement of posterior teeth? is best answered by assuming that we are confronted with a case which is in perfect balance.

Decreasing the inclination of incisal guidance necessitates a rearrangement of the anterior teeth and, in conjunction, may call for a decrease in prominence of the compensating curve or a decrease in cusp-height progressively toward the anterior, or may permit the placing of the molars closer to the mandibular ridge. A moderate application of each suggested change is often more acceptable than the alteration of one factor only.

Increasing the inclination of incisal guidance calls for a rearrangement of the anterior teeth, together with an increase in the prominence of the compensating curve or an increase in cusp height progressively toward the anterior, or for placing the molars closer to the maxillary ridge.

There is not time to cover the subject of posterior tooth selection and arrangement. It may be said that steep condylar and incisal guidance suggests the use of steep cusped teeth; flat guidance suggests flat or shallow cusped teeth.

Owing to the detrimental influence exerted by an excessive prominence of compensating curve, the use of cuspless posterior teeth is usually contraindicated in cases presenting steep condylar and incisal guidance.

Cases presenting deep overjets are usually best served by the use of a posterior tooth presenting zero cusp height anteroposteriorly, such as channel posterior teeth, except, of course, in the presence of steep condylar guidance. Channel posterior teeth are provided with lateral cusp inclines which permit of balanced occlusion in lateral relations. Flat or cuspless posterior teeth are useful only in cases presenting flat condylar guidance and flat incisal guidance, if the object is to establish balanced occlusion.

SUMMARY

The arrangement of the anterior teeth should meet the esthetic and phonetic requirements of the patient and at the same time contribute to the solution of the mechanical problems in full denture construction.

Anterior tooth arrangement and trying in should precede the selection and arrangement of posterior teeth for the reason that the incisal guidance inclination, together with the right and left condylar guidance inclination, establishes the balanced occlusion problem for the individual case.

If the operator desires to meet the esthetic and phonetic requirements of the patient, preestablished compass arcs, basal occlusal guides or predetermined posterior tooth forms usually complicate rather than simplify tooth arrangement in balanced occlusion.

DISCUSSION

Charles M. McNeely, Brooklyn, N. Y.: Dr. Jordan has presented three facts about incisal guidance which are basic. It is essential that this be thoroughly understood. These basic facts are: 1. The true incisal guides are the anterior teeth. 2. The position of these teeth is arbitrarily determined by the operator in accordance with his conception of esthetic values and mechanical influences. 3. The so-called incisal guide on an articulator is, when adjusted, merely the mechanical equivalent of the guidance established by this anterior tooth arrangement. Dr. Jordan states that its use merely prevents displacement of these previously arranged anterior teeth. This may be true with Dr. Jordan, but it is of great assistance to me in setting up the posterior teeth, and in grinding or milling the finished dentures. It is much easier for me to observe accurately whether the pin maintains contact with the plate in various positions than to make the same observations in the anterior

teeth themselves. As stated in the paper, the condylar guidance and incisal guidance having been established, there are three remaining factors. Of these, the plane of orientation is a resultant rather than a positive factor, and so need not be considered. The other two are cusp height and prominence of the compensating curve. Both of these factors must be correlated with the others, to obtain balance. The guide is an aid in detecting interference in setting the teeth, by noting whether the pin fails, in any position, to make contact with the plate. It is helpful in milling in the finished dentures, to locate points of interference. The lateral inclines especially are helpful in detecting and locating interference in the lateral cusp inclinations. I am convinced that the most important factor, from the standpoint of the patient and the patient's family, is the matter of appearance. Our skill will be severely questioned, and the patient will have innumerable difficulties trying to master the use of artificial dentures, if they are unsatisfactory in this respect. I was glad, therefore, to hear Dr. Jordan say that it is seldom, if ever, advisable to sacrifice esthetic values in order to obtain balance. There is another point in this paper which will stand emphasizing. That is the pernicious custom, which is so widespread, of placing the mandibular teeth anteriorly to the ridge. This is wrong, because it tends toward a steeper incisal guidance, which Dr. Jordan has shown to be faulty. It is wrong because it causes facial deformities. It is wrong because it adversely affects phonetics, and it is wrong from the standpoint of mechanical balance. The reason that so many dentists make this error is somewhat obscure. It could be that not sufficient emphasis has been placed on it by teachers in college, or perhaps a host of men forget what has been taught and accept the case as it comes from a laboratory. The error is so bad and so nearly universal that teachers, lecturers and clinicians must keep eternally at it, until members of the rank and file of the profession learn that these mandibular teeth should be set directly over the ridge. Referring to the use of posterior teeth presenting zero cusp height, in cases presenting deep overjets and steep condylar inclinations: It frequently becomes necessary, in such instances, to use reverse incisal guidance. This is as objectionable as steep guidance and should be avoided.

Dr. Jordan: Many realize the function of incisal guidance and profit by its use, while others have neglected to employ it in the interest of improved esthetic values, or as a means of detecting and correcting undesirable incisal or cusp inclinations, which contribute to denture instability and tissue trauma.

THE GINGIVAL RESECTION METHOD OF TREATMENT OF PERIODONTOCLASIA*

By FRANK KAISER, D.D.S., Los Angeles, Calif.

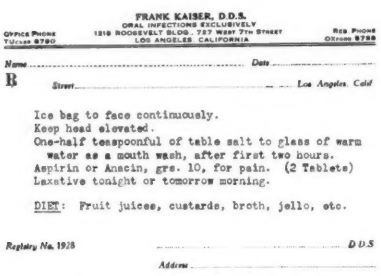
THE case for the method here presented has been thoroughly gone into according to the suggestions made last year,[1] and I wish to make it clear that all the more conservative methods have been ruled out in favor of the gingival resection method. It is customary in my office, in many cases, to blend all the different technics at our disposal, since mouths may present different stages of the malady known as periodontoclasia, and it is absurd to consider any method as the one of choice when a combination of all of them would be more advantageous to the patient. Gingival resection is referred

*The papers of Drs. Kaiser, James and Dement were presented as a symposium.

*Read before the Section on Periodontia at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

1. Kaiser, Frank: Oralogic Diagnosis, J.A.D.A., 19:1290 (Aug.) 1932.

to by many men as the "radical" method, and I wish to voice my sentiments against this expression. The radical method of treatment involves extraction of the teeth. The resection method is more radical than the dissection method, or subgingival curettage, but the principal factor in any method is the thoroughness with which it is done, plus the postoperative cooperation of the patient, without which failure is sure to result. Men who are skilled in any of the foregoing methods have demonstrated for years that good results have been obtained, and I do not wish to infer that any of these time-tried methods should be discarded for the one under discussion unless the latter is especially indicated in the case in question.



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Los Angeles California

Office Phone TUcker 8790 — Res. Phone OXford 8788

Name ..... Date .....

B Street ..... Los Angeles, Calif

Ice bag to face continuously.
Keep head elevated.
One-half teaspoonful of table salt to glass of warm water as a mouth wash, after first two hours.
Aspirin or Anacin, grs. 10, for pain. (2 Tablets)
Laxative tonight or tomorrow morning.

DIET: Fruit juices, custards, broth, jello, etc.

Registry No. 1928 ..... D.D.S.

Address .....

Instructions to patient for home care.

In the event the patient has no systemic involvement from absorption of toxins from the gingival areas; or, after physical examination and consultation with the physician, we decide against the opening up of large areas, or time is not an important factor, the more conservative methods of treatment may be the technic of choice. When the patient is suffering from systemic involvement, due possibly to absorption of toxins from the gingival area, and time is an important factor, the only logical thing to do is to eliminate these areas and the resultant toxins as quickly as possible by the gingival resection method, after making a bacteriologic examination which will determine the type of infection. These types of cases are treated daily by the Vastine method until the patient has built up a resistance to this infection. This work has been advocated for years by Vastine, Keilty and me,[2] and, more recently, by Krogh.[3] A great many bacteria will be eliminated mechanically, and, by this method of treatment, the virulence of the infection will be reduced. There is a question in my mind as to just how long preoperative medication must be continued before the ideal time of operation is at hand. I do feel that this preoperative treatment is essential, because, in my former experience, before giving preoperative medication, I had the misfortune of having a great many postoperative difficulties, such as dry sockets and toxic fevers, which have been eliminated entirely by the above mentioned subgingival therapy. In many instances, it is impossible to obtain a negative smear by this type of preoperative medication. I have found by bacteriologic examination that when the organisms have been reduced to one-half the original number or less, the time is opportune for surgical procedure. I do not wish to infer that my cases present no postoperative complications. In emergency cases, if the operation must be performed immediately and there is no opportunity for premedication, the old difficulties still arise.

There are two methods of procedure: the office technic and the hospital technic. In doing this work in the office, I prefer to use a local anesthetic, and have found it very helpful to employ some form of preoperative medication. After considerable experimentation with different

2. Footnote 1, p. 1293.

3. Krogh, H. W.: Reduction of Gingival Flora Preceding Operation, J.A.D.A., 19:659 (April) 1932.

types of drugs, I am now using one of the sodium barbiturates, administering it orally from a half hour to an hour before operation, according to the case. It is advisable to bring the patient to the office and carry out this medication. If this is done before he leaves home, and as in some cases an effect is produced quickly, the patient being particularly susceptible to the drug, the psychologic effect is bad. Consequently, the patient is requested to come to the office from a half hour to an hour before the contemplated time of operation and is given the dosage which seems correct for his individual case. Procain is used in the areas to be operated in, infiltration being employed in the maxilla and nerve-blocking in the mandible. As strict adherence to hospital technic is a decided advantage, the use of rubber gloves as a routine procedure in this work is advisable. After one has become accustomed to the use of gloves, he can work faster, as the hands will not come in direct contact with blood and a more delicate touch is therefore possible. The technic is the same as will be described later for hospital work, with the exception that the patient must go home afterwards, and he should be accompanied by someone who will relieve him of the responsibility of driving and of finding his way home alone. Before leaving the office, the patient is given instructions, typed on a prescription blank (shown in the accompanying illustration). The patient is advised to keep in touch with the office by telephone, reporting on the progress of the case. If necessary, house visits are made in order to give the patient the best attention possible.

Wherever possible, it is my custom to hospitalize these cases. The patient is then given a physical examination by the interne of the hospital, the afternoon of the day before operation. The following laboratory examinations are made: urinalysis and blood examination including cell count, percentage of hemoglobin, and bleeding and clotting time. The last is not obtained routinely but when the history indicates the necessity, this information is obtained.

At 10 o'clock the night before the operation is contemplated, the patient is given from 1½ to 3 grains of a sodium barbituate preparation orally, followed by a glass of hot water or milk. At 6 o'clock the following morning, if the operation is scheduled for 8 o'clock, the patient is taken to the lavatory, is dressed for the operation and is immediately put back in bed. The shades are drawn to create an atmosphere of quiet. The patient is not disturbed any more than is absolutely necessary, and is again given from 1½ to 3 grains of the sodium barbiturate preparation orally, followed by another 1½ to 3 grains at 6:30. At 7 o'clock, a hypodermic of morphine, grains one-quarter, and scopalamine, grains one one-hundredth, or atropine, one one-hundred-fiftieth, is given, according to the case. (The age, temperament and weight of the patient are considered in determining the dosage in preoperative medication. It is well to start with the foregoing method, and a quarter of an hour before the operation is begun, the patient should be observed and, in the event the desired effect has not been produced, another hypodermic in half the former amounts may be given in addition.) This medication will usually induce a state of thorough relaxation without producing sleep. This condition is desired to assure the patient's utmost cooperation in holding his head in any position that is most advantageous to the surgeon. If there is too much preoperative medication, the patient will doze off, the purpose of this method being thereby defeated.

A few minutes before 8 o'clock, the patient is sent to the surgery. All pre-

cautions are taken that would be taken in any other surgical operation. The patient is operated on in the reclining position. This may be difficult at first, but when one becomes accustomed to working in this position, he will prefer it to the sitting posture. The patient will be more comfortable, as he will be relaxed, and one of the causes of surgical shock will be eliminated. If a dissection or resection, an extraction or the removal of residual roots or cysts is contemplated, procain is used in the areas of operation, to prevent pain. The infiltration method is used in the maxilla, and nerve blocking in the mandible. It is extremely important that the injections into the maxilla be made high in the mucobuccal fold, opposite the roots of the teeth, in order not to enter an infected area. When an entire mouth is to be anesthetized, procain is injected at the rate of 1 c.c. per minute, the anesthetist having a finger on the pulse of the external maxillary artery. In the event that the pulse is quickened, injection should be stopped to allow a normal condition to prevail. With this method of application, possibly from fifteen to twenty minutes will be consumed in producing anesthesia. I use a light epinephrin injection in the maxilla, and stronger solution in the mandible. After the injections have been made, into the maxilla first and into the mandible immediately afterwards, sufficient time will have elapsed to start the operation in the maxilla at once.

There are various technics for so-called gingival resection sponsored by different men who have their own sets of instruments. I have tried, at some time or other, all the different technics described in the magazines available to dentists. The technic as outlined and the instruments of my choice were originally designed by A. W. Ward of San Francisco, and close adherence to the technic which he originated over ten years ago has, in my hands, produced the best and most rapid results.

Before operation, the frenum should be checked with the width and shape of the central incisors, as it has a great deal to do with the esthetics of the finished results. In the event a large space exists between the central incisors, cutting of the frenum is not indicated, as it will leave a corresponding flat spot which will considerably mar the appearance of the patient. If the frenum is not cut, it is resected and the bone curetted, the operator being sure to cut back the gingival trench so that all the epithelial tissue will be removed, as no tissue will attach to the epithelium.

The interproximal curets are placed against the distal surface of a tooth with the cutting edge toward the gingiva, the instrument being boldly moved back and forth through the gingiva into the necrotic bone, and a slight rotary motion given the instrument at the depth of the pocket toward the mesial surface of the neighboring tooth. This procedure is repeated with the instrument against the mesial surface of the neighboring tooth, following the same technic, but the instrument is inclined mesially to connect with the previous incision, which is also the depth of the concavity in the bone. This will produce a sort of triangular piece of tissue, taken from the interproximal space, which can be removed with the same instrument. By this technic, the bone has been curetted to the depth of the concavity of the crest of the alveolar process, and that interproximal space is completed with those two general motions. It should be remembered that the teeth on these curets are so designed that they will not cut good bone, but merely curet, as the name of the instrument implies. I have found that recurrence has been the result of lack of curetting; and that, in the hands of the inexperienced,

timidity plays a most important rôle in failure.

This operation is continued in each interproximal space throughout the mouth where resection is intended. The depth of the incision will vary according to the depth of the destruction of the crest of the alveolar process. These incisions are connected at their greatest depth with sharp lancets especially designed for this work, cutting through the bone as far as the tooth, and the tissue and bone are removed with other suitable instruments especially designed for this purpose. The crest of the process remaining is now smoothed on the labial, buccal and lingual surfaces with other suitable instruments, and it is necessary that all the pathologic tissue be removed, as well as that the fibers of the peridental membrane exposed be curetted. This is done by scalers with the cutting blade toward the bone. The cementum is freshened and the field of operation cleaned as thoroughly as possible. On account of the time element, it is not always possible to remove all of the calcific deposits at this time; nor is it necessary, as this can be followed up later in the office in the postoperative treatments, where a thorough scaling and polishing of the teeth is done after regeneration of the gingival tissues. It is very necessary not to neglect curettement of the bone or the peridental fibers at the junction of the cementum and the bone, as the tissue will heal over this area very quickly and no opportunity will be afforded for reexamination. The scaling referred to above consists in removal of the heavy, serumal deposits, which would require considerable time and prolong the operation unnecessarily because of hemorrhage. At subsequent postoperative treatments, a thorough scaling and planing of the cementum of a few of these teeth at a time can be done, as a thorough vision of the area to be scaled can be had.

In the event a tooth is to be extracted, and I can see no justification for not doing all the surgical work at one time under these most ideal conditions, instead of removing the gingiva and bone as above described, a partial alveolectomy is performed.

If third molars are to be extracted, it is necessary to remove any remaining portion of the capsuls, curet away any cystic formations and eliminate the epithelial-lined pockets of these cysts. By approximating these tissues with sutures so that two connective surfaces are in position, healing by first intention is very much more common than has been the case heretofore. The entire field of operation is covered with a surgical cement, which should be locked at each interproximal space, covering the spaces previously sutured where extraction has been done, and protecting the wound in its entirety. This cement will harden a few minutes after coming in contact with the saliva, and should be trimmed so that it does not interfere with the occlusion.

The patient is returned to his bed to sleep off the effects of the narcotics. Ice bags are applied to the face by means of towels tied around the head and secured by safety pins. The towels are lapped over the ears to protect them from the ice. The head is kept slightly elevated. No special care is needed except that the patient be put on a liquid or soft diet as indicated. Mouth washes are not necessary except for cleansing purposes.

A hospital visit is made in the evening, and the temperature, pulse and respiration rate are noted. A laxative is prescribed to eliminate any possible toxins absorbed and also to eliminate any blood which may have been swallowed. A hospital visit is also made in the morning of the following day, when the temperature, pulse, respiration, edema and condition of the surgical pack are noted. Nine-

ty-five per cent of patients are dismissed at noon on that day, although out-of-town patients are detained an extra day as a general precaution. In the event of trismus, infrared rays and ice packs are used intermittently, with gratifying results. The ice is discontinued after from twenty-four to thirty-six hours, and the infrared rays are used exclusively about fifteen or twenty minutes on the affected side every two hours. The patient is instructed to keep in touch with the office by telephone, and in the event of complications, I am immediately informed. These are usually nil, but sometimes the pack breaks off and it is desirable to put it back on as soon as possible. There is no definite time for the removal of this surgical pack. The present trend is toward leaving the pack on longer than heretofore. Many men leave the pack on for a period of weeks, although previously one week was considered sufficient. I find that if the tissue is tender on removal of the pack, it is a good plan to repack and leave the pack on for another week or two. As time permits, after the pack has been removed, the case is gradually scaled until scaling is completed and after the hyperemia of the peridental membrane has subsided, any remaining teeth which still might be loose are examined very carefully as to the occlusion and adjustments made to correct trauma. It has been found that little adjusting of occlusion is done as compared with what was done years ago, owing, I believe, to the fact that the reduction of the inflammation of the peridental membrane allows the extruded tooth to reestablish its original position in the alveolus, which reduces trauma.[4] I therefore feel that, in some respects, this treatment, instead of being ultraradical, when viewed through the eyes of an unbiased individual, is more conservative, as soft tissue can be regenerated, and it is impossible to regenerate valuable tooth structure which has been ground off by overenthusiastic advocates of the hyperocclusion theory.

This case, when completed, will have a mouth void of any foci of infection, in ideal condition, with the proper foundation upon which suitable dentures can be expected to give maximum service over a long period of time, provided the patient cooperates.

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4. Kaiser, Frank: Surgical Treatment of Pyorrhea Alveolaris, J.A.D.A., 16:1303 (July) 1929; Footnote 1, p. 1297.

CONSERVATIVE TREATMENT OF PERIODONTAL DISEASES*

By AUSTIN F. JAMES, D.D.S., Chicago, Ill.

A DENTIST can never presume nor hope to treat periodontal disease until he has developed and mastered a technic for thorough prophylactic treatment. Prophylaxis may mean just as many different things as there are oral hygienists or practicing dentists attempting to do this type of work. It is not the intention to discredit any effort in this direction but to commend it. I shall describe what I believe to be a successful prophylactic result.

In my practice, I consider my efforts a failure until the patient can return at subsequent sittings with all exposed tooth surfaces free from mucin or plaque formation (including exposed root surfaces where there has been alveolar bone absorption and gum recession), showing no irritation of the gum margin and with the gum margin thin and lying firmly against the tooth surface. If in the beginning there was an unclean tooth and an inflamed gum condition, and this result has been obtained, we can be sure that much has been accomplished. The next step is to determine how long the patient can maintain this condition with the gum massage and home care that he has been taught.

In my experience, when a thorough prophylactic result is obtained as described, the oral bacterial growth has been reduced to the minimum. If there has been formation of periodontal pockets, the surgical care of the root is a simple thing, the "planing" as I prefer to call it, removing all serumal deposits and rendering smooth the cemental surface that is rough enough to resist the blade of the plane. As a result of this surgical stimulation, the overlying gum which has formed a pocket will react in such a way that it will hug the root surface. Thereafter, the patient must massage this overlying gum by squeezing it; which will cause the circulation to improve and increase the resistance of the gum tissue. Continued massage will make the gum recede to a point where there is alveolar bone attachment, and the pocket will be obliterated just as effectively as by any possible cutting operation.

The advocates of cutting suggest that we must get rid of diseased bone. It is my contention that there is never any necrotic bone in a periodontal infection. Healthy living alveolar bone has been resorbed, while dead or badly diseased bone can never be resorbed. Any bone that remains around a tooth is living. It is only the tissue cells attacked by bacteria retained in the pockets that produce the disturbance. When root surfaces are made perfectly smooth and the pocket is cleaned, healing begins immediately. We do not have to wait ten days for a

*Read before the Section on Periodontia at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

"wonder pack" to do its work. If root surfaces are made properly smooth, there could be no possible reason for cutting away or putting any kind of a pack or astringent drug on the gums. The fewer the tissue cells injured or destroyed, the quicker the recovery.

If all exposed root and enamel surfaces are polished and a correct technic is employed in the use of the toothbrush, with squeezing and massaging of the gums, the teeth being cleaned at the same time, the bacterial count will be reduced to the minimum or to the point where there will be no reinfection.

In this paper, all systemic and possible diet complications have been ignored, because we are dealing only with local treatment, and we are in no position to study the general and diet complications until an unquestionable hygienic result has been obtained.

Modern training in pathology makes the younger dentist regard any degree of local infection as serious. He has been trained to employ radical measures to eliminate all such conditions. It is quite common to hear of cases in which serious study and careful diagnosis have led to the recommendation of extraction of teeth or the radical cutting away of tissue and curetting of alveolar bone to eradicate tooth and bone infection.

It may be true that the older men are too easy going and too conservative especially when systemic complications are to be considered. Years of experience make the older dentist confident that a little kind treatment given a sensitive pulp at the proper time and with the proper technic may keep the pulp alive, and thereby the necessity of devitalization would be avoided and the problem of root canal filling eliminated. If every dentist would consider the simplest gingival congestion or inflammation with the concern it warrants and give the same thorough but gentle treatment that was given the pulp referred to, surely the consideration of more radical methods later on would become unnecessary.

Where there has been alveolar bone resorption, wide open interproximal spaces resulting and many dental restorations required, the mouth is dentally crippled. Such a case must have the care of the periodontist and hygienist at regular intervals for the rest of the patient's life or as long as the teeth can be saved.

Failures are seen in every type of dental endeavor and the periodontist has backsliding and careless patients in spite of his attempts at teaching home care and the patient's responsibility. Continued effort of the periodontist to teach will finally yield encouragement in the fact that he is becoming a better teacher. The reward will be fewer backsliding patients and a greater number of successes in his practice.

The successful periodontist has become so skilful in the delicate operation of smoothing root surfaces that it is a matter-of-fact sort of thing and the temptation is to believe that all dentists do the work equally well. But this is not true, and I wish to emphasize the fact that there is no operation in dentistry that requires finer skill or a more delicate manipulation of instruments, stroke and method of bringing a lasting polish to all denuded and natural tooth surfaces.

THE SURGICAL TREATMENT OF PERIODONTOCLASIA*

By ROBERT L. DEMENT, D.D.S., Atlanta, Ga.

IN approaching a discussion of the surgical treatment of periodontoclasia, no attempt will be made to launch into a new and untried field of surgery, since the so-called radical surgical procedure dates back to 1862, when Robitzek, of Vienna, "treated cases of periodontoclasia by an excision of infected gum tissue followed by scraping of the exposed alveolar bone."[1] Riggs, of Hartford, Conn., was the first dentist in America to treat periodontoclasia surgically, in the year 1866.

Dr. Riggs, according to Arthur H. Merritt's "History of Periodontoclasia," which was read before the American Academy of Periodontology, at New York, in 1921, confined his efforts to the conservative method of subgingival surgery, condemning gingivectomy as "barbarous."

The flap operation for the elimination of the lesions in suppurative periodontoclasia dates back to 1912. Robert Neuman, of Berlin, states that he had been "practicing flap operations for the treatment of pyorrhea since 1912." He also asserts that he first established this operation on a systematic and rational basis and that no such work was presented to the profession before 1914.[2]

The ideal in the treatment of suppurative periodontoclasia is not only the elimination of the pathologic conditions existing in the periodontium, and a minimization of the possibility of their recurrence, but, at the same time, the gingival tissues must, as nearly as possible, be left normal.

Now we may get a clear picture as to what constitutes a normal gingiva, reviewing the various methods of treatment in use at the present time for the eradication of the pus pockets found in this condition.

The normal labial and lingual gingival tissue has an even contour as traced vertically from the buccal fold or from the palate to the crest of the marginal gingiva, without any swelling or bellying out as this point is approached. The marginal gingiva itself terminates in a thin knifelike edge. The health of the underlying bone and pericementum is indicated not only by the color of the gingival tissue, but also by the solidity of the teeth.[3]

Conservative Treatment.—This method, advocated by some of the outstanding men of the profession, and used extensively, without referring to the pre-

*Read before the Section on Periodontia at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

1. McFarland, H. M.: Systemic Effects of Pyorrhea and Technic for Surgical Eradication, J. A. D. A., 19:651 (April) 1932.

2. Berger, Adolph: Surgical Treatment of Periodontoclasia, J. A. D. A., 14:1013 (June) 1927.

3. Stillman, P. R., and McCall, J. O.: Clinical Periodontoclasia, New York: The Macmillan Company, 1927.

operative or postoperative treatment or care, has for its purpose the removal of the pathologic condition by subgingivally curetting from the lesions the apoxemena. Then, under conditions of cleanliness of the oral cavity, with stimulation, the gingival tissues recede to the extent that the lesion is eliminated by recession or by reattachment of the tissues to the root of the tooth, and the lesion is closed. In the conservative treatment of the deeper lesions, a solution of sodium sulphide is packed into the areas in order that the diseased granulation or epithelial tissue may be broken down. It is then removed by light curetment. Under postoperative care, the lesion closes and reattachment takes place.

Gingivectomy. —This procedure, which is being followed by still another group of outstanding men in the profession, without reference to the preoperative or postoperative treatment or care, has for its purpose the elimination of the deeper as well as the more moderate lesions, where the process has been broken down, by excision of the gingival tissue to the depth of the lesions and also by the smoothing of the process. In cases of vertical pyorrhea, the process extending coronally and supporting the adjacent tooth is removed to the depth of the lesion, the type becoming what is known as horizontal pyorrhea. With different dressings, these areas are covered and allowed to heal, complete elimination of the pus pockets resulting. With proper postoperative care, these tissues are restored to a healthy state and so-called pyorrhea alveolaris is completely eliminated.

Full Flap Operation.—This operation, as done by such outstanding men as Neuman, of Berlin, and Zintler, of New York, and without reference to the preoperative or postoperative procedures, consists in making incisions laterad from the field of operation, well beyond the depth of the lesions, clipping the interdental papilla, and, with suitable periosteal retractors and forks or tissue forceps, lifting the gingival tissue back for the extent of the lateral incisions, and thus enabling the operator to completely visualize the field: teeth, process and the area beneath the gingival tissue. After complete removal of all diseased granulation tissue, calculus and necrosed bone and smoothing of the operative area, the flaps are trimmed to adaptation and fitted back snugly, the field is thoroughly irrigated with some bland solution and the flaps are sutured back, laterally as well as interproximally and, under suitable dressing, are allowed to heal.

All of these methods are being followed by men of unquestionable reputations in the profession, with very satisfactory results.

For a number of years, I have confined my efforts in dentistry to the field of periodontia. The method taught in my dental college days, by William Crenshaw, one of the "grand old men" of the profession, was the conservative, or subgingival curettage. He confined practically all his efforts to the use of the file, and with quite remarkable success.

After a short period in general dentistry, while associated with the late Thomas P. Hinman, in 1917, I entered on the practice of periodontia as a specialty, and, on account of previous teaching, followed the conservative method of treatment, with more or less success and for a number of years. In some cases, it was very difficult to obtain the results desired in that some of the deeper lesions refused to respond to the treatment regardless of the thoroughness with which the operation was performed. It was noted that failure occurred where there

was a bulk of granulation tissue and destruction of the process.

After spending some time in the offices of Thomas B. Hartzell, Paul R. Stillman and R. G. Hutcherson, Jr., my work improved considerably, but the results were still far from what I desired. Not that the technics followed were insufficient or incorrect, but, in my hands, they were not adequate, since I failed to reach the mass of diseased granulation tissue in the deeper lesions; nor was I able to remove all of the broken down process and leave it smooth.

After much thought and persistent effort in applying the conservative method of treatment, and after seeing many clinics and reading articles on the surgical treatment of pyorrhea alveolaris by some of the foremost men of the profession, I saw Arthur Zintler, of New York, perform his full-flap operation. This appealed to me as a step forward from the excision method of treatment, as regards esthetics, in that it preserved more of the gingival tissue and maintained somewhat the normal gum line, without the complete destruction of the process which acts as a matrix in the regeneration of new tissue. At the same time, this operation permitted the operator to visualize the field and consequently led to a more thorough eradication of the pathologic tissue without the degree of guesswork which, it seems to me, must surely accompany the conservative technic.

After following the Zintler technic in several cases, in which the results, in the deeper lesions, were much more satisfactory, I eliminated the lateral incisions, except in isolated spots; with as good results, and not nearly so much trauma to the tissues.

Early in 1925, I spent some time in the office of Olin Kirkland, of Montgomery, Ala., observing his modification of the flap operation, in which he was securing excellent results. I adopted this method, with perhaps a few slight changes, and for the past seven and a half years the service rendered my patients has proved much more satisfactory.

After following the conservative, or subgingival, surgery method of treatment for a number of years, experience taught me that many of the less severe lesions could be successfully treated without resorting to the more radical procedure, provided the work was done thoroughly and the cooperation of the patient was secured. The latter, as we all too well know, is very important, if lasting results are to be secured with any method of treatment. The more radical procedure is used only when the conservative procedure is deemed insufficient.

My reasons for employing the modified flap operation as a regular procedure are fourfold: 1. The field of operation is visible, and thus greater thoroughness is assured. 2. Every available portion of healthy process is used as a matrix, along with the blood clot beneath the flaps, as the latter are sutured back to position, for encouragement to regeneration of new process. 3. There is esthetic value in leaving the gum line as nearly normal as possible. 4. Less trauma is caused than in any of the other so-called radical operations.

Technic of Modified Flap Operation.—When a thorough prophylactic treatment has been given, the patient is carefully taught home care of the mouth, with particular emphasis on the importance of thorough cleansing and stipulation of the supporting tissues, especially the interproximal. After the patient has thoroughly mastered this technic, which, as a rule, requires coaching, with patience and perseverance, and the occlusion has

been balanced as nearly as possible, surgical eradication of the pathologic conditions is undertaken.

The patient is given from 30 to 40 drops of aromatic spirits of ammonia in a glass of water, or 2 teaspoonfuls of elixir of phenobarbital in a glass of water, as a sedative. Procain is injected, with block anesthesia, preferably.

Only when the mucoperiosteum is very dense and the lesions are more than 3 mm. in depth is the tissue removed buccally, lingually and labially. This is done with knives such as those designed by J. D. Towner, of Memphis, Tenn., or Dr. Kirkland, care being observed to make the excision very smooth, to avoid trauma and slow healing. With a slender lancet, such as is used in eye surgery, the interproximal tissue is severed as near the center, buccolingually or labiolingually, as possible, with care to make the incision to the full depth of the lesion and mesiodistally. With a small, slender periosteal retractor, passed to the depth of the lesion, one-half the papilla is retracted labially and one-half lingually. The gingiva is carefully pushed back far enough to expose about 2 mm. of process and, at the same time, the mass of diseased granulation tissue filling the lesion is exposed, as well as the entire field of operation. In this way, the operator can visualize the whole field as the gingival tissue is retracted with suitable tissue forceps or hooks.

With curets of suitable shape and size, the apoxemena (granulation tissue, calculus, necrosed cementum and process) is removed and the sharp spicules and rough edges of process are so rounded as not to act as an irritant to the tissue in healing. With suitable nippers, the diseased granulation tissue is removed from the inner surface of the gingival tissue as it is retracted. The interproximal flaps are replaced and trimmed to the point where they fit closely. The flaps are retracted and the field is thoroughly sponged and inspected. Any deposits or fragments of tissue remaining are plainly visible and are removed. The field is thoroughly irrigated with surgical solution of chlorinated soda (Dakin's solution), and the flaps are sutured to position with 0000 fine dermal suture or horsehair and a curved needle. Hot packs are then placed over the field, being held in position for from about one to two minutes, to aid in securing a good blood clot beneath the flaps and for the soothing effect, as well as checking secretions from the gum tissue. The teeth and gums are dried with air and a dressing composed of one part English resin and three parts pink baseplate wax is applied with a camel's-hair brush. This dressing is almost gum color and so is not very noticeable. The dressing is allowed to remain from two to four days, and, when removed, if healing is not sufficient, is replaced. Sutures are removed in from four to six days, as a rule, but when necessary, may remain in for eight or ten days.

Of course, patients are instructed to refrain from brushing the gums, mastication and the use of hot liquids while the dressing is in place. After removal of the dressing, the patient is instructed to use physiologic sodium chloride solution as a mouth wash frequently, and, after removal of sutures, to continue the use of the saline solution for several days and brush the gums very lightly, increasing the vigor of the brushing as the tissues will permit.

After the case is well on the way to healing, a thorough polishing is given, particularly at the gingival border. The patient is instructed to return at regular intervals for prophylactic treatment, and examination, at which time the home

care which the patient is giving the mouth, as well as the occlusion and the state of health of the gingival tissues, is determined.

Several men have advanced the flap operation as the correct procedure in the treatment of the deeper lesions of pyorrhea alveolaris since Neuman's first efforts, and the more I see of the work, the more thoroughly I am convinced of the efficacy of the procedure. Carl W. Hoffer, of Nashville, Tenn., might be mentioned in addition to others referred to previously.

I have endeavored to evaluate the various methods now being used in the surgical eradication of so-called pyorrhea alveolaris and, at the same time, to give reasons for adopting the modified flap operation as a regular procedure in my practice.

It is not the intention to convey the idea that the full flap or gingivectomy is never resorted to, as it most assuredly is. There are many cases in which the full flap is clearly indicated. In many cases in the posterior part of the mouth, where there is a slight invasion of the bifurcation area of molars, and occasionally in the lower anterior teeth, under certain conditions, gingivectomy has proved very effective. It is found advisable to use all methods very frequently, and even then it is difficult enough to eliminate, and keep eliminated, some of the conditions we are called upon to treat.

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CORRELATION OF SYMPOSIUM

By JUSTIN D. TOWNER, D.D.S., Memphis, Tenn.

THE symposium to be correlated is necessarily a discussion of local surgical technic rather than prophylactic procedures or systemic treatment incident to periodontal practice. Each essayist proclaims prophylaxis and home care as essential to success. Dr. James and Dr. Dement emphasize this as a preliminary and postoperative necessity to recovery and maintenance of a healthy periodontium. Dr. Kaiser stresses the importance of the physical index and the Vastine method of reducing gingival flora before operation. In this, he has the support of many periodontists who agree that the discovery of infection and its specific reduction is an essential part of preoperative prophylaxis. Mechanical cleaning, stimulation and instruction of the patient he also regards as final requisites.

The apparent difference of opinion in the selection of surgical technic seems to be based primarily on the histopathology of tissues involved, especially that of the alveolar process. Dr. James asserts that there is "never any diseased bone in periodontal infection." He states emphatically that "dead or badly diseased bone can never be absorbed," and concludes that "any bone remaining around a tooth is healthy." On this premise, he questions the advisability, and certainly the advantage, of removing any of the alveolar process as part of the apoxemena. To this, he adds the self-evident fact that

"the fewer the tissue cells injured, or destroyed, the quicker the recovery." These are important observations for periodontists to consider in determining surgical procedures. It is here that surgical judgment has an opportunity to assert itself.

Dr. Dement, in his advocacy of the modified flap operation, or dissection method, bases his choice on the advantages of visualizing the field, and of retention of the matrix, the esthetic values and reduced trauma. Of these advantages the more conservative surgical procedure may justly lay claim to three, or all but the first. The question arising here is: Does the advantage of visualization outweigh that accruing from tissue conservation and avoidance of surgical shock? If exposure of the field is an absolute essential, subgingival curettage becomes merely a palliative treatment, and, as such, is contraindicated. The fact is that both means seek the same end in respect to pronounced cure as does conservative practice. The former does this with the least amount of trauma or tissue destruction and greater stimulation of cell resistance and regeneration. In fact, subgingival curettage may be termed "salvation surgery."

Resection, as advocated by Dr. Kaiser, proposes the excision of all diseased tissue and exposure of the surface under treatment, conversion of vertical pockets to the horizontal type, and reduction of the labial, buccal, and lingual alveolar crest to a plane commensurate with that of the pocket concavity. These purposes in themselves seem sufficient to relegate this technic to a position of last choice, except perhaps in retromolar, bifurcation and lingual areas. In any instance, the host is destroyed in the effort to effect a cure. This results in much tissue destruction with no preservation of the matrix to encourage rebuilding. Personal experience teaches that slight absorption of the alveolar process usually follows this form of surgical destruction rather than regeneration to any appreciable extent; and, as the healthy gingival line depends on its supporting structures, there is little or no hope of regaining or even maintaining an esthetic contour. This fact, added to resultant exposure of large areas of cementum, with consequent sensitiveness and possible pulp involvement, argues against its extensive practice.

Dr. Kaiser deserves commendation for the excellent care he provides patients. Their hospitalization is a wise precaution in impending surgical shock. Periodontists as a rule do not consider periodontoclasia in any of its usual manifestations a hospital disease, or its treatment one that demands such facilities. The fact that Dr. Kaiser considers it such is evidence of his serious effort to render the greatest service.

Of the three surgical methods under consideration, subgingival curettage, dissection and excision, the first is the least spectacular, yet demands more skill, as well as persistent, painstaking effort in its consummation. These characteristics prove to be in inverse ratio in radical operations.

Since the elimination of periodontal pockets demands absolute removal of contributing conditions, including the presence of excessively deep gingival crevices, under all circumstances, periodontists will have occasion to resort to all methods in a liberal practice. A complete knowledge of periodontal surgery is essential to adequate service. Operative skill without judgment in the choice of technic does not insure desirable results.

1206 Exchange Building.

TREATMENT OF A MUTILATED DISTOCLUSION CASE*

By G. VERNON FISK, D.D.S., Toronto, Ontario

History.—A boy who was nursed until the age of 9 months and then given a full diet, including plenty of vegetables, fruits and milk, and whose general physical condition was reported as having been above the average, with mild attacks of chickenpox, whoopingcough and measles, had the tonsils and adenoids removed at the age of 10 years. The teeth of both parents were of exceptionally good quality and in good alinement.

At the age of 6 months, owing to a fall, the maxillary decidous first incisors were lost, and again, at 10 years, the mesiolingual corner was knocked off the maxillary right first permanent incisor when the patient fell downstairs. Examination revealed a slight discoloration of the maxillary left first permanent incisor, the pulp chamber appearing smaller than that of the corresponding right incisor. As the dentist reported that the tooth responded to the usual vitality tests, the root canal was not treated. The mandibular right first permanent molar was extracted about one and a half years before treatment was commenced.

Comment.—Both congenital and environmental conditions may contribute to the malformation termed distoclusion. In children who have hypothyroidism (which may be genetic), there is a predisposition to adenoids and enlarged tonsils. While this predisposition has also been noted in poorly nourished children, the history of this particular case would not seem to indicate that the diet had been faulty. J. Sim Wallace states that "the conditions giving rise to post-normal occlusion arise in early childhood, probably to some extent at least before the eruption of the temporary teeth."

Diagnosis.—Photographs of the patient (Fig. 1), which were taken in November, 1924, when the patient was 12 years of age, and casts of the teeth made at the same time (Fig. 2) show a protrusion of the upper incisors and retrusion of the mandible. The mandibular right first permanent molar had been lost. The case was diagnosed as distoclusion (mutilated) with deep vertical overbite and a horizontal overbite (overjet) in the incisor region of three-quarters inch.

Treatment.—In December, 1924, pin appliances with auxiliary springs, as shown in Figure 3, were placed on the maxillary and mandibular teeth and intermaxillary rubbers applied. In April, 1925, after the diastemas between the maxillary incisors had been closed, planes were added to the lingual surfaces of the maxillary incisor bands to correct the overbite and to encourage the forward growth of the mandible. When placed on the teeth, the planes were 1½ inches long, this being the minimum length which, when the mandible was closed in its most posterior position, would prevent the incisors closing behind the planes. Intermaxillary elastics were continued and, within three weeks, it was possible to

*Read before the Section on Orthodontia at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

remove about one-quarter inch from the planes. They were gradually shortened and were finally removed, Jan. 11, 1926, when study casts are made. (Fig. 4.) Improvement in the overbite as well as in the relationship between the maxillary and mandibular incisors is evident. During the time the planes were worn, intermaxillary elastics of equal strength were used.

A review of the case at this time indicated that the mandibular incisors had shifted to the right and that the mandible required further forward growth stimulation, about the width of a bicuspid. As normal molar relations had been estab-

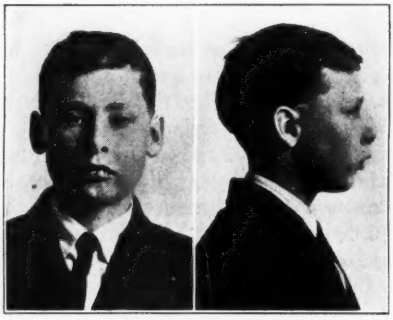

Fig. 1.—Photographs of patient at commencement of treatment.

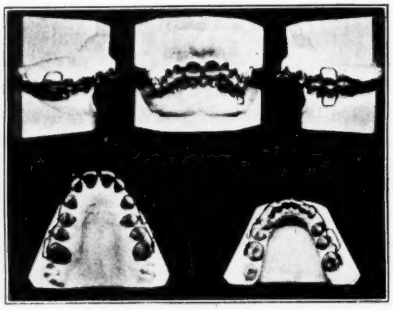

Fig. 3.—Casts fitted with pin appliances with auxiliary springs as used to treat case.

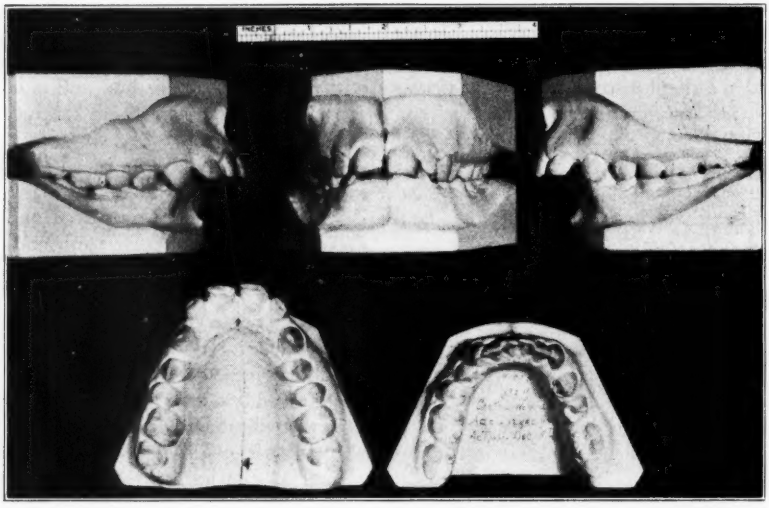

Fig. 2.—Casts of teeth before treatment, showing partial closure of space caused by extraction of mandibular right first permanent molar.

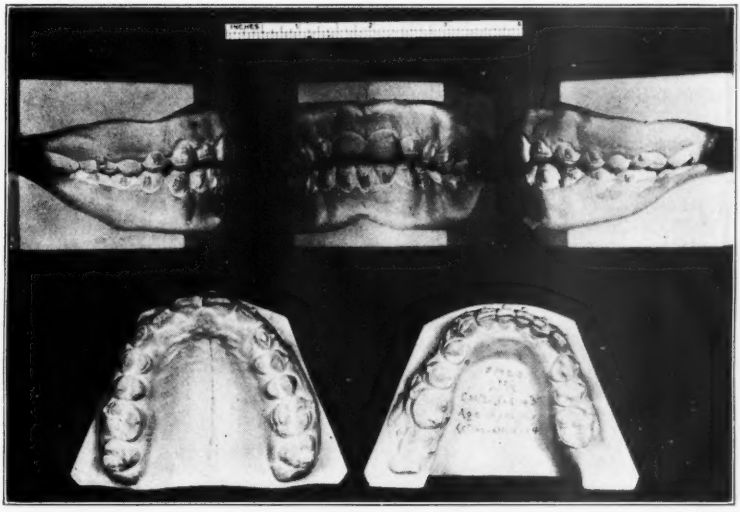

Fig. 4.—Teeth after thirteen months' treatment.

lished on the left side, and as third molars were developing, it was not practical to carry posteriorly all the lower buccal teeth, while stimulating forward growth of the mandible. The mandibular left first bicuspid was therefore extracted and the space closed by carrying posteriorly the lower left cuspid and shifting to the left the mandibular incisors.

After this was accomplished, planes, as used by George W. Grieve, were added to the buccal surfaces of the first permanent molar bands, May 19, 1927. They were removed for a short period, but were replaced in November, 1927, and were employed until July, 1928. The maxillary pin arch and the anterior bands were then removed and a labial arch was used to close the spaces. In January, 1929, the labial arch was replaced by a Hawley retaining plate. The mandibular pin arch was removed in February, 1929. The profile roentgenogram was taken in April, 1931. (Fig. 5.) The intra-oral roentgenograms of the case, taken at the same time,

Fig. 5.—Profile roentgenogram taken two years after removal of all appliances.

reveal some root absorption, which is not surprising when the extent of movement is considered. (Fig. 6.)

As some slight interference was noted in the region of the cuspids during the lateral excursions of the mandible, these points were polished off at the same sit-

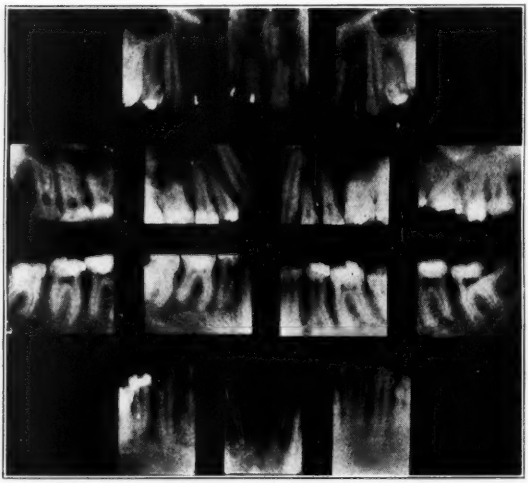

Fig. 6.—Intra-oral roentgenograms of case after treatment, showing some absorption of roots of maxillary incisors.

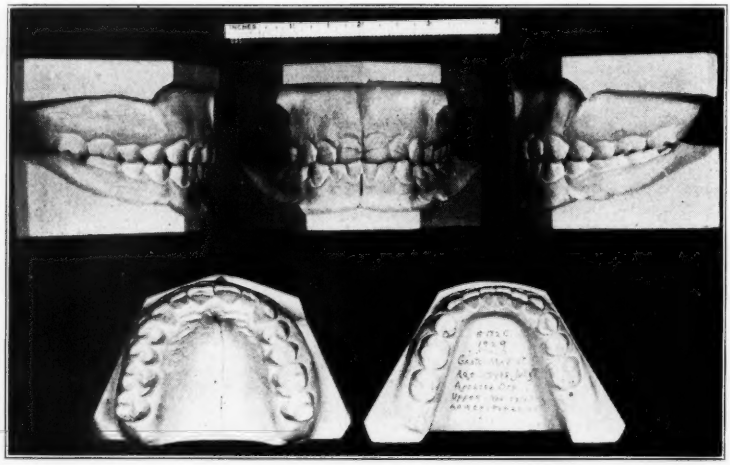

Fig. 7.—Casts of case two years after the removal of all appliances.

ting. The "inflation" exercise for the development of the upper lip was prescribed.

Casts of the case (Fig. 7) were made in April, 1931. Photographs taken at the same time are shown in Figure 8.

Results. — Normal occlusal relations have been established on the right side with a serviceable interdigitation of the cusps of the teeth on the left side. The mandible has received definite forward growth stimulation, while the overbite

Fig. 8.—Photographs of patient after treatment.

has been practically eliminated. The facial expression has decidedly improved and normal respiratory function has been instituted.

Prognosis. — As periodic examination of the case since the making of the final casts reveals no undesirable movement of the teeth, the prognosis is considered favorable.

Conclusions. — The favorable physical background of both parents probably accounts for the excellent general physical development of the patient. This inherent growth has unquestionably been an important factor in attaining a satisfactory orthodontic result; which might be extremely difficult in many other cases presenting the same degree of malocclusion.

If the case were presented today, considerable time might be saved in treatment. The use of a plate constructed on a lingual arch would obviate the use of the incisor planes for the correction of the overbite. The planes constructed upon the molar bands would in all probability be used to assist in the forward growth of the mandible.

THE BUSINESS PHASE OF CHILDREN'S DENTISTRY*

By WALTER C. McBRIDE, D.D.S., Detroit, Mich.

WHEN a dentist in a general practice refuses to work for children or fails to render them satisfactory service, he is disregarding one of the finest factors in practice building. Certain men can afford to do this and still have a practice that is constantly replenished by the references of their age-increasing and death-diminishing original patients. Practices, through the years, seem to keep pace with increasing years of the operators. Patients of men who have practiced from twenty-five to thirty years are, to a great extent, older patients. A friend of mine, popular among his associates in high school and college, and who attracted to himself in the beginning years of his practice young people of his own age, with simple restorative needs, and who has now practiced thirteen years, says that in the last few years his work has grown to be a partial denture and bridge service mainly. Another acquaintance with thirty years of service to his credit says that 75 per cent of his practice is denture construction, a great deal of which is for patients who came to him in the beginning years of his practice.

A dentist just out of college opened

*Read before the Section on Mouth Hygiene and Preventive Dentistry at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

an office in a town of 2,000 inhabitants where two dentists had practiced successfully over a period of years. They were not particularly receptive to the idea of having a newcomer conscript a pittance from their income, and one particularly who had the audacity, as a beginner, to install beautiful new equipment and employ an office assistant as well. Two things—that his income was somewhat discouraging and that he especially liked children—led him to suggest to the older men that, as they did not enjoy children's work, which he did, he would be glad to have them referred to him. The idea met with immediate approval and the children came. They liked the new dentist, apparently because he knew something of the functioning of the child's mind and acted accordingly. A favorable report was carried home to the parents. Soon the mother came for an appointment, with the statement that anyone who can work for children and make them like it must have a benevolent regard for an aching and sore tooth and must use a great deal of dexterity in caring for one. Finally came the father. In three years' time, two new equipments and two additional dental assistants came to town as an inducement for the return of the forfeited patients. It was not equipment and assistants that were needed, but a favorable attitude and regard for the young patient.

Under the heading "The Business Phase of Children's Dentistry" must of necessity come the discussion of fees. The question of fees is an old story, imbued with many interesting and perplexing ramifications. In this article, I should like to dress it up and attempt to make it appear more attractive.

BASIS FOR FEES

Certain operators in exclusive pedodontic practices employ the yearly contract arrangement, i.e., a fee-per-year basis for each patient, paid at periodic intervals throughout the year, and to include every necessary service as well as a monthly examination and prophylaxis. This idea is not new, having been used with success by many operators in the east over a period of years. It is advantageous in that the cost is definite and uniform. It is disadvantageous, primarily, because it is difficult to maintain over a period of years a monthly schedule of visits, and, secondly, because human nature, under such a procedure, presents a procrastinating tendency on the operator's part toward incipient needs of the patient.

Children's dental work almost of necessity, I believe, must be handled on an hourly basis. Just as long as children's work is cared for on a fee-per-operation plan, just so long will the average operator feel a decided lack of interest in working for children. In this plan, all work is done at an hourly rate with the exception of prophylaxis and extraction, cost of which is more or less uniform. A fee-per-hour basis will maintain the morale and composure of the operator when working for an obstreperous child who demands more than the expected time. It will also equalize the cost of fillings. Many times, little is done of an operative nature at the initial appointment, but a great deal is accomplished by way of instruction to the young patient and the building up of confidence and friendship. A small occlusal pit filling or a sedative treatment at the first appointment hour may bear the same fee as the filling of two or three teeth at the second appointment. When the work is completed, the total fee, prorated, satisfactorily equalizes the filling costs as far as the parent is concerned.

ESTIMATE

With new patients of apparently ordinary means, and especially if an un-

usual amount of work is required, an estimate should be given. I remark to the parent of these children, after I have examined the child, "Would you like to know something of the cost of the work?" With the affirmative reply, I continue, "If we extract these teeth, the bill for the work will be $——, if we treat and maintain them it will be $——." This gives the parent an option which might of necessity be governed by the family exchequer. I advise and stress the importance of maintenance or extraction, as the case may be. Many times, the character of the work must be controlled by the family pocketbook. Again, possibly the importance that I may place on some restorative need may induce the parent to have the work done at the sacrifice of some minor desire or luxury. When a request comes by phone for an estimate, I always say, "I can give you an estimate at the examination time or a definite stipulation at the end of the first appointment." To patients coming in for examination, I say, "The charges for the work will be approximately $——. If you'd like a definite stipulation, I will give it to you at the end of the first appointment hour." In this arrangement, I can ascertain the child's response and how rapidly I can proceed with the work. It permits, as well, a more thorough examination of questionable teeth.

When an estimate is given, the parent will invariably ask, as he or she momentarily tries to reckon the scale of cost per operation, "How much do you charge per filling?" To this question, I have worn threadbare the following reply, "I have no charge per filling. Many times I will put in three or four fillings for three of four dollars and many times charge that much for one. The cost is dependent on the size of the cavity and the response of the child." The next immediate inquiry is, "Do you charge by the hour?" If you admit that you do, you will again be confronted with another embarrassing situation, for the solicitation will come, "How much do you charge per hour?" When asked if I charge by the hour, I usually reply. "Yes and no. I look over the mouth and decide in my own way about how many appointments will be required and the length of the different appointments." If it can be avoided, one should not admit making an hourly charge, even though this method is the only satisfactory one to employ in caring for children.

The stipulation that "the cost will be dependent on the size of the cavity and the response of the child" makes parents solicitous of two things: (1) the detection and filling of small cavities, and (2) the good behavior of the child. They appreciate that if the child comes in regularly, the fillings will be smaller and will, therefore, cost less, and also that if the child behaves well, the cost will be less. Any reasonable procedure which ultimately extracts less from the family purse has appeal.

PAYMENT

Arrangements for payment can easily be made at the time the estimate is given. There are many middle-class people a bit too proud to ask an estimate. Many times, these parents wish to pay at each appointment. Of all the abominable plans of payment, psychologically at least, the pay-as-you-go plan leads the list. When a mother remarks at the end of the appointment hour, "How much will that be today?" I always reply, "I'll tell you how much the total bill will be and you can pay what you care to now."

For example, I may know that the work will cost about $22, but no estimate was asked or given. If, at the end of the first appointment, the mother inquires, "How much will that be today?" and I

reply "$5," she instinctively thinks that I'm "high-priced" because apparently so little was done. At the second appointment, I may ask for $7. She may not think that too much for the amount of work done (at the second appointment, one can accomplish a great deal more because the child is already familiar with procedures), but she has not $7 with her, and coupled with her embarrassment is the thought again that my prices are high. And so on, through the four or five appointments necessary to complete the work. On the other hand, I can state what the total will be and allow her to leave as much each time as she desires; state what the total will be at the completion of the work, or send a statement at the end of the month and the money will be paid without a sign of protest. If they do think I am "high-priced," it will only be once, which is a distinct advantage psychologically over the other plan.

As an illustration, suppose that, enroute to the office this morning, your car failed to function and, to correct the trouble, the mechanic charged $4.50. If you happened to have $10 with you, the $4.50 didn't affect you too much, because you still had $5.50 to carry you through the day. But if on another day when you have but $5.00 with you, the same things occurs, and the garageman charges you $4.50, you instinctively think him a "robber." Human nature—you and I alike. This, coupled with the fact that people carry little money with them in these days, is my reason for suggesting that the pay-as-you-go plan is psychologically wrong.

AFTER-SCHOOL INCOME

It is common knowledge that the after-school hours, from 4 to 6, are the lull hours in the average practice. It is too late for the mother who must prepare dinner and too early for the father who must come after business hours. This makes an excellent time to serve our child patients. For example, let us utilize this two-hour period for four one-half hour appointments daily for children for one week and see what are the results attained. To do so, one must first decide how much he should earn per hour to offset his overhead and gain an average net return. One may select four or six or eight or ten or more dollars per hour as he chooses, but perhaps $6 would approximate the average for the majority; so, for this example, we will use that figure. If you feel it is not enough, you may add accordingly to the total; if too much, you may subtract. To begin with, we will assume that the 4 o'clock patient Monday afternoon requires prophylactic care and one small pit filling. This can be done in thirty minutes, with a resultant fee of $3.00.

The next patient at 4:30 requires a number of restorations, but today, contrary to the usual custom of attempting to fill six or eight badly broken down teeth at one appointment, thereby completing the work at one appointment, but entailing subsequent difficulty with work to be done over, we elect to place two proximal fillings only. The cavities can be prepared with step preparations, isolated and sterilized, a cavity liner applied, a matrix used and the alloy filling well mixed, packed and carved in thirty minutes if we work diligently; fee, $3.00—a very fair fee.

The third patient requires a number of small occlusal fillings. On the basis suggested above, possibly one could place three or four or five small occlusal fillings in thirty minutes; charge, $3.00—an unusually low fee, but it carries the point we have in mind that greater frequency of visits will reduce the cost of service because of the time requirement

incident to small fillings. Consider this occasion an opportunity to emphasize the advantage of frequent appointments. If, in this instance, the operator feels that the fee is too low for so great an apparent service and increases it, he immediately defeats his purpose.

The 5:30 patient again may need a prophylactic treatment and the removal of an exfoliating tooth; fee $3.00. This makes a total of $12 for the two-hour period, $60 for the week, and $240 for the month, as follows:

4:00: Prophylaxis; 1 occlusal filling,	$3.00
4:30: 2 proximal fillings	3.00
5:00: 4 small occlusal fillings	3.00
5:30: prophylaxis; extraction	3.00
	$12.00

As you look at this chart, you will perhaps admit that the addition and multiplication are correct and that the proposition looks well on paper, but that it is not practical. It is practical: for ten years, I have earned a livelihood strictly on this fee-per-hour basis, a condition which you will find true in nearly every office where children play an important part. Further, should the operator earn $240 in denture or bridge construction, the laboratory and material cost would be possibly from $40 to $60. In $240 earned in children's work, I am sure the material cost would not exceed $12. The proportionate net gain is always much greater in a children's practice.

COST OF SERVICES FOR CHILDREN

Sweet, of Oakland, Calif., cared for 110 institutionalized children over a six and one-half year period at a fee of $7 a year and I learned that the cost of dental services for these children was $11.40 anually. At the recent American Dental Association meeting, in a verbal report, he qualified these figures by stating that he had, in the last few years, increased this number to 2,000 children, and found that the average of $11.40 was constant. This average fee included three examinations and prophylaxes a year, at four-month intervals, and all the other necessary dental service.

He uses this fact in his private practice, stating to parents that the average cost of dental services for children is $12 a year, or for the length of time that children remain with the pedodontist, approximately ten years, approximately $120. I think this is an excellent thought to present to parents who come seeking an estimate on their children's immediate needs. The initial costs are always greater, as his records showed, but the follow-up work per year was sufficiently reduced to reduce accordingly the fee to the average as stipulated.

Sweet's records were as follows:

110 children, 6½ year period, $7.00 per hour.

Initial appointments ($2.34 to $18.32), average $12.44.

Follow-up, per year ($7.09 to $10.27), average $9.38.

Combined (initial and follow-up) ($0.41 to $13.11), average $11.40.

SOURCE OF INCOME

Back in 1929, when conditions were such that a little variation in the income brought a storm of protest and concern, I heard repeatedly from dentists these familiar words, as business conditions were solicited, "Keeping busy all right, but just small things—prophylaxes and amalgam fillings, but nothing big." Always, being a pedodontist, this lack-of-business-sense attitude irritated me and made me feel at times as if I'd like to go out and acquire a monkey and a fiddle and attempt to replenish both productively and financially a practice that was made up entirely of just small things—prophylaxes and amalgam fillings, but nothing big.

Prompted by this thought, I made up a chart and used it throughout 1931 to ascertain what phase of my work was most productive. It is as follows:

Prophylaxes	23.0%
Fillings	47.0%
Gold inlays	2.5%
Extractions, local anesthesia	2.4%
Extractions, general anesthesia	10.1%
X-rays	2.1%
Treatments	5.3%
Miscellaneous	6.0%
Broken or cancelled appointments	1.6%

To me, the most amazing and gratifying thing shown here is that I derived approximately one-fourth of my income from the simple, ordinary and plebian task, prophylaxis. I appreciated fully also the value of a general anesthetic in a practice devoted to children.

PRACTICE SUGGESTIONS

The few suggestions made here are not entirely new; in fact, some are very old, but I list them purely as a reminder of their usefulness and effectiveness.

Acknowledgment Card.—I have always acknowledged the reference of a patient by either telephone or card, but preferably with a card. Referring dentists appreciate that acknowledgments of this type are merely matters of form, but they are pleased to be informed that Mrs. Brown, whom they directed to a certain office, has come in for treatment. It is no more than ordinary courtesy to inform or be informed.

While only a courteous formality as regards a referring dentist or physician, this card has an added psychologic value when received by a referring layman. Men in general practice could effectively utilize this acknowledgment courtesy as all their references come entirely from lay people.

Prophylaxis Card.—In my practice, this card is sent to all children at four-month intervals until the permanent teeth are erupted (at approximately 12 years), at which time a twice-yearly notice is sent. A statement from the superintendent of schools quoted thereon has proved of value in having children excused from school.

Excuse Slip.—Children who have appointments during school hours are given a slip, filled in and signed, which is taken back to the teacher. This information, coming from the dentist, satisfies the teacher that the child has actually been to the dental office, and makes her willing to permit absences for further treatment. Too, it places one's name before the educational staff; ethical and inexpensive advertising.

Appointment Card.—Many times, out of three or four possible appointment dates given, the patient will select one and then, in the confusion of an afterthought, return at the wrong hour and, many times, the wrong day. Utilizing the reverse side of one's business card as an appointment card, at little additional cost, will almost entirely eliminate this confusion.

List of Names of Children.—For the psychologic appeal it makes, I keep an alphabetical list of the names of all my patients. Usually, when the mother calls for an appointment, she says, "This is Mrs. Abbot. I'd like to make an appointment for the children." Momentarily, the assistant turns to the name given, and learning what the children's names are, remarks, "You'd like the appointment for Kingsley and Laurine." One can almost feel the pleasure in the mother's voice from this simple and apparent remembrance of the children's names.

"MEMORY CHASERS"; NOTATIONS ON RECORD CARDS

I am impressed with the idea that, in every dental appointment, there is some-

thing of professional, of business and of social nature. Accordingly, on my record cards, I make notations that may be classified as you see fit. In any case, at the subsequent appointments the information listed is of considerable importance.

From a purely professional point of view, so that I may appear familiar and conversant with conditions at all times, I make the following notations (taken at random from cards in the file):

Mentioned need for orthodontia. Referred to .....

Suggested need for spacer. Parent uninterested.

Advised excision of frenum at 7½ yrs. as laterals erupt.

Two exfoliating teeth with cavities. Will extract if trouble.

Molar grooves deep. Parent advised.

Asked concerning orthodontia. Advised waiting 1 yr.

Advised extraction. Parent wished retained if possible. Treated.

Notations of a business nature I list in case there is any question regarding the amount or the payment of the bill:

Appt. cancelled at appt. time. Child did not want to come. $.....

Broken appt.—Armistice parade. $.....

Cancelled 8:30 A. M. Child has measles. (No charge.)

Cancelled appt. Accident. (No charge.)

Cancelled appt. at appt. hour. School test. (Next appt.: Child said no test: went to show.) $.....

Broken appt. Called after appt. hour. $.....

Notations of a social nature are made for the human interest they may portray. It makes for a pleasant atmosphere to ask questions regarding the new baby, the home recently built, the camp John went to for the summer, etc.:

Going to grandfather's farm for summer.

Going to Camp Interlochen.

New baby brother—John Francis.

Moved into new home.

Brother Bill broke hip—in cast at Harper Hospital.

Moved temporarily to Kansas City.

Father leaving for Austria on radio commission.

There are two factors in children's dentistry that have been totally unexpected and have been overlooked, and have proved very encouraging to those engaged in its practice; i. e., the constancy of the work and the constancy of the collections. It is human nature to supply the child's needs first. If your funds are low and both you and your child need dental attention, there is no question whatever as to who receives the first care. This fact can be verified by the constancy of the work in pedodontic practices, even during these days of depression.

The constancy of collection can be attributed to the fact that charges for children's dental services are never large at any one given time. Sweet suggested the range of charges at different periods. The average amount on the statements leaving my office monthly, that is, the total amount divided by the number of children treated, varies between $8 and $11. Comparatively, these are small bills; and when the recipient, like dentists, becomes panic stricken about the ninth or tenth day of the month because there are not sufficient funds in the bank to care for the entire indebtedness, he sorts out the small bills into one pile, the larger ones into another, and pays the small ones first. The bill for the child's services falls into the first group and the check comes in. Should there be any left over, the dentist attending the parent may receive a $5 installment on the $150 denture or removable bridge.

CONCLUSION

The story is told of a man who especially enjoyed fruit for the final course of his meal and who always put on magnifying glasses when sitting down to eat.

To him, it made the apples and grapes, his favorites, appear more tempting and appetizing than the other foods. Likewise, I feel that the dentist who evades dental service for the child is wearing magnifying glasses seeking and seeing only the wide open spaces where bridges and dentures, his favorites, might be inserted. Both are optical illusions; the first, an insult to an expectant stomach; the second, representing the gambler's viewpoint, whereby a possible constant and average remuneration is forfeited in exchange for the probable big fee operation of intermittent occurrence.

If one can view pedodontia from the standpoint of advertising, from that of a constant average remuneration, and as on a fee-per-hour basis, he will see much of merit in its practice.

TIME REQUIRED TO CAST DENTAL RESTORATIONS FROM MOLTEN ALLOY*

By WILMER SOUDER,† Washington, D.C.

DETAILS of the dental casting operation have for years commanded the attention of the profession. This interest becomes evident on inspection of the equipment produced from time to time as the most efficient for casting dental operations.

This paper gives little more than an approximate measure of the time required for an average pattern cavity to fill with molten gold. There are a few hints of possible use in diagnosing failures in casting.

METHOD

A section was cut from a casting ring and a flat piece of fused quartz inserted as shown in Figure 1. Wax patterns were placed against the inner surface of the quartz plate and were sprued to the crucible former. They were invested, burned out and cast according to the regular procedure. During the act of casting, a motion picture camera was operated to record the entry of the molten gold alloy into the cavity. (Figs. 2, 5.)

DETAILS

A stop watch was placed in the field of the camera to verify the rate of exposure, which was approximately 25 to each second. Hence, the time elapsing between successive photographs, beginning at the top and reading downward, is one-twenty-fifth second.

A casting pressure of 10 pounds per square inch was applied by using a Burns type of machine having automatic pressure release which operated to apply the pressure as soon as the flask was sealed by the descending cap.

Melting was carefully controlled, an oxyhydrogen gas mixture being used. This type of flame was employed to shorten the melting time and not to in-

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*Publication approved by the acting director of the Bureau of Standards of the U. S. Department of Commerce.

*Read before the Section on Partial Denture Prosthesis at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

crease the fluidity of the molten alloy. It is believed that the usual casting temperatures were approximated although no temperature measurements were made.

The gold was a combination of new and scrap inlay alloy of 80 (Baby Brinell) hardness.

The investment was an A.D.A. specification type, except in one instance, when plaster of Paris was used unintentionally. This was not discovered until mixing was started, and it was then decided to continue with the plaster of Paris for the one casting. The time interval was not different for this casting from those using regular investment.

The wax was burned out at about 1000 F. and castings were made as quickly as possible after the crucible was taken from the oven. The elapsed time may have amounted to one or two minutes in some instances.

The castings were intended to represent certain types of restorations; e.g., bar, mesioclusodistal inlay, and flat plate. The bar, 2 inches long, was formed into a double U shape to facilitate continuous vision of the flowing gold and, further, to attempt to detect the effects of upward and downward flow of molten alloy. (Fig. 2.) The flow was so swift that no conclusions could be drawn regarding differences arising from direction of flow. The mesioclusodistal inlay was of usual size and was sprued at the top. The small dark area appearing at the upper right in Figure 3 is not molten alloy entering the cavity, but is a shadow resulting from the position of the illuminating lamp.

Two flat plates were cast, one 22 by 18 by 1.5 mm. (Fig. 4); the other, 45 by 45 by 1.5 mm. (Fig. 5.)

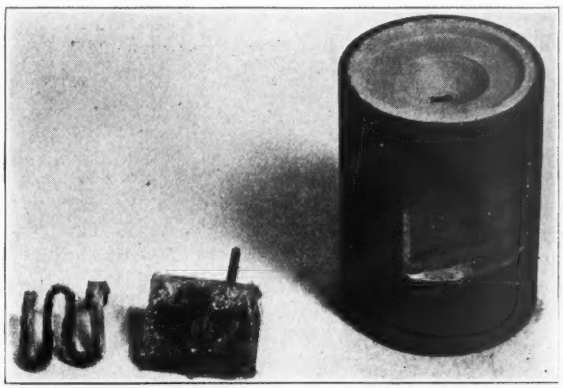

Fig. 1.—Casting ring with quartz window inserted. Two castings made against this window are shown at the left.

The sprues were rectangular sections 1.5 by 2 mm. on the double U and smaller flat sections. On the larger flat surface, a flat sprue 1.5 by 6 mm. was used.

RESULTS

The results show that the cavities were filled in a surprisingly short time. The mesioclusodistal cavity appeared to be filled completely in one-twenty-fifth second or less; the bar, or double U,

cavity, in two-twenty-fifths seconds; the small flat cavity, in perhaps slightly more than two-twenty-fifths second, and the large flat cavity, in three-twenty-fifths second.

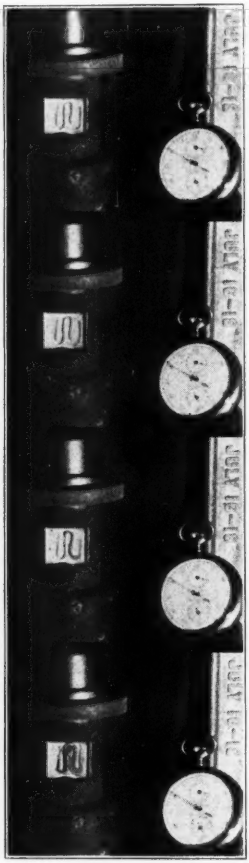

Fig 2.—Casting bar bent to double U shape.

The alloys seemed to lose their fluidity very quickly on contact with the quartz window as the light spots on the window (subsequently identified as bubbles of gas) did not move or float to the top of the alloy as we should have expected if the alloy had remained molten for any appreciable time.

It should be kept in mind that the quartz plate used in all tests is not porous; hence, the bubbles which show in the photographs would not have remained had this surface been porous as is investment. No comment or explanation is offered as to the source of these bubbles except to suggest that they may

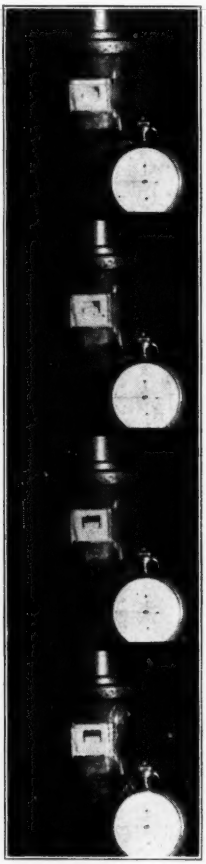

Fig. 3.—Casting usual mesioclusodistal inlay.

result from vaporized foreign substances on the quartz, air included in the flow and adjustment of the alloy or gases released from the solidifying alloy.

In one instance, the alloy did not cast when the pressure was applied. An inspection disclosed a partially cast and frozen sprue. An irregular broken sprue-crucible margin suggested that the molten alloy flowed into the irregularity where the investment had been broken out on removing the crucible former and, by reason of the distortion in the surface film of molten gold, the effective surface tension was not sufficient to support the weight of the mass of gold. Had an application of air pressure been made at the instant that the surface film broke, it is thought that the casting would have been completed, provided sufficient molten alloy had been available in the crucible.

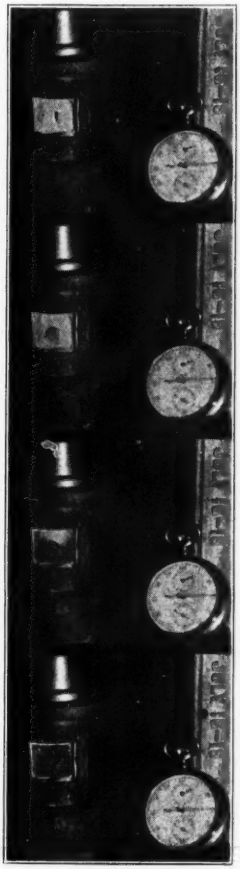

Fig. 4.—Casting flat plate.

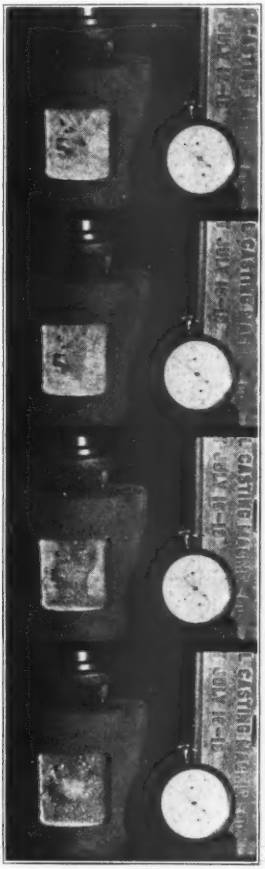

Fig. 5.—Casting flat plate.

CONCLUSIONS

The following conclusions appear to be justified:

1. Most dental castings are completed in a surprisingly short time; namely, one-tenth to one-twentieth second.

2. Failure of the cavity in the investment to fill completely may result from a back pressure caused by the rapid vaporization of foreign material in the cavity, such as incompletely eliminated wax, flux spilled or blown into the cavity or moisture from insufficiently heated molds, all of which may generate quantities of gas or vapor, when hit by the molten alloy, too great to pass through the investment before solidification of the alloy.

3. Many instances in which the sprue only is cast, on air or vacuum casting machines, are probably the result of irregularities in shape at the crucible-sprue margin or the use of a sprue so large that molten alloy falls through. Delay between the sealing of the cap over the crucible and application of casting pressure, in the air pressure machine, may contribute to this difficulty, as a very slight increase in pressure incident to the sealing of the cap over the crucible may start a small quantity of alloy into the sprue and cavity, but fail to continue the flow, during which interval the advance alloy solidifies. This will block further flow when the pressure for casting is applied.

4. The use of multiple or wider flat sprues would reduce the time of the dental casting operation. The use of additional sprues would protect against failure from an initial flow or lock in one defective sprue.

SUMMARY

1. Many dental castings require only one-tenth second or less time.

2. Incomplete castings resulting from the employment of frozen sprues is not primarily caused by too rapid chilling of the alloy.

3. No evidence of air block or rebound of alloy due to air block was detected.

4. Complete elimination of wax, care to keep flux from the sprue and cavity, and smooth, regular sprue-crucible margins are necessary for the best castings.

5. No statement in this paper is justification for a claim for superiority for any type of casting machine.

DISCUSSION

Drs. Souder, Paffenbarger and Sweeney: Since Dr. Van Horn's discussions refer to the three papers presented at this meeting, the subjects of these papers must be kept in mind. There are indeed differences encountered in making inlays for teeth in the mouth and for the steel die. Most of the dental castings produced at the Bureau have been made by the indirect method. We have not been unmindful of different compensations involved in the direct and indirect technic, as was pointed out in a previous paper delivered in Washington, Oct. 9, 1929.[1] We have never yet seen an operator who could cut a tooth cavity so difficult to fit as the cavities in steel, which are cut to mechanical precision. We do not refer to undercut and other types of cavities which cannot be fitted. The steel die is a much more difficult cavity to fit. It has been our experience that any one mastering the art of fitting the steel die through a careful balancing of the variables of wax, investment and alloy dimensions has no difficulty in fitting teeth. The steel die is easily adjusted to mouth temperatures by placing it in a pan of water at body temperature during the waxing and fitting operation if one wishes to use it so. We believe the steel and brass dies still have a useful function in the dental school, study club and in many dental offices. We can join with Dr. Van Horn in saying that our reports are not restricted nor hampered beyond the requirement that they must be constructive and must be verified as far

1. Taylor, N. D., and Paffenbarger, G. C.: Survey of Current Casting Technics, J.A.D.A., 17:2058 (Nov.) 1930.

as it is possible to verify findings in a previously unexplored region. No data or convincing evidence has come to our attention which would indicate the superiority of any type or make of casting machine. When it can be shown that the physical properties of gold alloy castings can be improved by a certain type casting machine, a distinct advance will occur in the science of dental casting. Test specimens have been prepared in the Bureau of Standards dental laboratory on both air pressure and centrifugal machines and also by pouring. No significant difference in the physical properties could be shown by any of the three foregoing methods. As to the bubbles appearing on the gold alloy where it touched the fused quartz plate, it is not believed that the amount of pressure available in any dental laboratory would cause them to disappear, but it is our belief, as stated in the paper that the bubbles which show in the photographs would not have remained had this surface been porous as in investment.

CAST BRIDGEWORK IN FUNCTIONAL OCCLUSION*

By F. S. MEYER, D.D.S., Minneapolis, Minn.

ALL modern bridgework consists of full cast crowns, three-quarter crowns or inlays for abutments. All porcelain facings of whatever type are cemented to the gold work to avoid seepage. Wherever possible the surface of the dummy in contact with the tissue is made of glazed porcelain. All surfaces of the abutments as well as the dummies can be easily cleaned, and this work is all done with a definite plan for restoring balanced and functional occlusion.

As there is a wide difference between the bridgework of the past and modern bridgework, so also may there be a wide difference between the bridgework of the present and that of the future. If the casting of bridges is adopted as the accepted technic, there will be three great and noticeable differences. First, there will be a marked improvement in the functional occlusion. So far, the occlusion has been more or less the result of guesswork, to be finished by spot grinding in the mouth. If it were possible to establish accurate centric, balanced and functional occlusion by spot grinding, we might have some satisfaction in the end, but the best men in the profession now know that it is impossible. We start with beautifully carved occlusal surfaces, and how do we end? If there is one cusp on the bridge which interferes with balanced and functional occlusion (and there always is), that interference may so upset the balance of the bridge as to cause interference elsewhere, where there would otherwise be none. If we do not know which interference is the cause and which the result, how are we to know where to grind? Furthermore, if we were fortunate enough to strike the right point of interference and ground it away, we would then find one or more new points of interference, because the bridge is nearly always too strong on occlusion. If that were not the case, it would probably be too short at some point. As a result of the technic now

*Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

employed, we grind until most of those beautifully carved cusps are cut away, sometimes reaching to the porcelain facings, and still the patient complains that the bridge is uncomfortable. Of course, that is not always the case, but it happens only too often; and with the present way of building bridges, there is no sure remedy for this.

Herman Maves' paper "A Plea for Healthier Investing Tissue" was excellent and should awaken interest in better dentistry; but better dentistry does not necessarily mean more beautiful dentistry. If, in the past, we have not succeeded in killing the abutment teeth by the shock of cutting away too much, we sometimes have finished the operation by strangulating them with too tight fitting crowns and other ill-fitting castings. We often cut off the blood supply at the tip of the roots by pulling them together too suddenly if they were too far apart to fit into the beautiful bridge that we had completed. Finally, if that failed to kill the abutment teeth, thus rendered sore, we tore them loose by a traumatic occlusion. And it is here that I make my plea for bridgework that will be comfortable from the first meal on.

In the death of Dr. Maves last March, the country lost one of its strongest champions of better dentistry. He was a man of the most magnetic personality, a man with greater power to arouse enthusiasm and a desire for improvement than any other man that I ever knew. Through his honest criticism, not only of the work of others but of his own as well, and his encouragement in all that I ever attempted to do, he was a wonderful stimulus to all my efforts. If this work which I am attempting to bring out shall prove to be of any value to the profession, I want him to have his share of the credit for it.

Secondly, there will be a total absence of solder joints with all the attendant and resultant difficulties associated with them.

Thirdly, there will be a total absence of any tension on the abutment teeth, which so often results in the case of large bridges. From the moment that the cement has set, provided the abutments are properly prepared, the bridges will feel comfortable and function as well as the remaining teeth in the mouth.

I do not believe that most men understand what brings about the tension on the abutments when a bridge has been soldered.

When about to solder a bridge, we heat the abutments and the dummies to the melting point of the solder. That is necessary with the blowpipes in general use. The dummies and the abutments expand until some of the space is closed between them. While these spaces are thus closed, the dummies and abutments are soldered together. When the bridge cools, it shrinks again, becoming shorter by the amount of the space that was closed by expansion during heating. If the abutments and the dummies are placed in absolute contact before soldering, that same shrinkage of the bridge will not appear, but a distortion will take place to make room for the expansion. If the contact happens to be farther toward the buccal or lingual aspect, there will be a larger bulk of solder on the lingual or buccal side of the contact point than on the opposite side. As this solder cools and shrinks, it will still further distort the abutments toward the side that has the larger bulk of solder. If the contact point is near the occlusal aspect and there is a V-shaped opening toward the gingival to be filled with solder, the shrinkage of that solder will throw the opposite end of the abutment toward the gingival, still further distorting the bridge. Absolute abutting

of the joints, surface to surface, would endanger the flow of the solder. By soldering the bridge piecemeal, it is possible to overcome some of these difficulties, but not all. This leads to other troubles. I used to solder one dummy to one abutment and the remaining dummies to another. These two parts were then placed in position in the mouth. It was always found that the two dummies were far apart and did not bear the same relationship to each other as before soldering. For instance, if we waxed up the six tooth anterior bridge and left the space between the two central incisors unsoldered, there would be a large opening between them after soldering the dummies on each side of the space to the cuspids. The porcelain facings for the central incisors would not touch, and the other facings would have to be relieved to go to place. Furthermore, if before soldering there were contact between an abutment and a tooth adjoining the bridge, and that contact were not tight enough to force the two teeth apart a trifle, it would be lost owing to the shrinkage of the bridge. We have been lucky in that nature has permitted us to force the abutments together to get the bridge to place. But have our patients always been so lucky? Is it not true that we have made permanent orthodontia appliances of some of our bridges? An orthodontist may decide to move a tooth through a considerable amount of space, but he does it gradually and within physiologic limits. How many dentists ever use the judgment of the orthodontist in gradually moving the teeth together to get a bridge to place? That would be admitting to the patient that the bridge did not fit. Therefore, no matter how much tension there was, if it were possible the bridge would often be forced to place on the abutments and allowed to remain for a few days until the abutments became comfortable or were strangulated in the attempt. Some of you will say "But I have never had that trouble." Be careful to whom you say that, because the very man to whom you are talking may have removed a bridge that you placed, after one or both abutment teeth have died.

When I consider all the trouble that we have had with the large bridges, and if we are honest we must all admit that we have had these troubles, I do not hesitate to offer to you all the cast bridge as a possible solution of the problem.

I want to divorce from your mind all ideas about full cast partial plates and the trouble that you have had with them so that you will have an open mind to accept the full cast bridge as a reality. I hope to prove to you that they are easier to make, can be made more quickly and are far more comfortable when they are made.

When it was discovered that a bridge could be cast in one piece apparently without any shrinkage, there was one great obstacle to a working technic for making them in practice; namely, the making of accurate duplications of the cavity surfaces of the abutment teeth in amalgam and the accurate transfer of these duplications, or dies as we shall call them from now on, to plaster models so that they bore the same relation to one another that the teeth or abutments did in the mouth. That had to be solved first. As necessity is said to be the mother of invention, that necessity was great enough to serve that purpose. The problem was quickly solved. By the so-called indirect-direct technic, it was possible to get along without an accurate reproduction of the tooth to be filled with an inlay or crowned, for the wax pattern could be checked and corrected in the mouth, but with the full cast

bridge, this would involve difficulties because the work is nearly all done on the model out of the mouth.

I shall outline the technic for making a full cast bridge. This technic has successfully passed the experimental stage and may now take its place among the operations of modern dentistry.

We shall start with a bridge, one from a second molar to a cuspid, as typical, a full crown on the molar and a three-quarter crown on the latter. I shall carry through every step, for there is scarcely a single step in the technic which is similar to what is taught today. The abutments are prepared in the same way as for an assembled and soldered bridge.

A copper cap that will cover one of the abutments with a little play is so adjusted that it will reach the gum line without a spring at any point. The edge is then trimmed to fit the gum line. Near the closed end of this cap, two small holes are cut on opposite sides. Through these holes, a loop of silk tape is tied to serve as a handle for the removal of the cap when the impression has been taken. If the impression is for a crown which is not to reach the gum line on one side, a section is cut out of the cap on that side so that it will not go too far beyond the bulge on the tooth. If it is for a three-quarter crown, nearly all the labial or buccal area beyond the bulge is cut out. A stick of green compound is softened and the cap filled. By means of a pledget of cotton, the assistant coats the abutment tooth with an extract of soap or the patient is requested to moisten it with saliva and the compound is immediately reheated in the cap and forced to place. By means of the loop of silk tape, the impression is removed from the tooth when it has cooled to mouth temperature or nearly so. It should not be chilled with too cold water. If there is a shoulder or finishing line on the abutment tooth, it should show definitely. If there is not, the impression should show completely to the end of the cap or at least to the point where the constriction commences. If there is any deficiency at any point it should be filled in, the correction being satisfactory as nearly as the eye can determine, but the filling a little short of completion if anything.

The tooth is recoated with soapsuds and the cold impression replaced on the tooth. With a blast of hot air, the compound is resoftened and the cap forced to place until the compound can be seen to emerge from the gingival end. Usually, this will complete the impression. If the band goes too far under the gum tissue, it may be trimmed off a trifle before being forced to place. If the impression has only a slight defect, the correction may be made on the kryptex die. This impression is then filled with model kryptex and a short root formed. The kryptex die is examined for undercuts. This die will often bulge just at the gum margin, with a constriction just below it. This defect in the preparation will not interfere with making the tray, but it should be corrected on the abutment tooth in the mouth before the final impression is taken.

At this time, it is well to make a temporary crown for the molar tooth, to be worn until the bridge is finished. A band of 22-carat 30-gage gold is fitted around the kryptex die, which is by this time separated from the impression. This band is soldered and some slits are cut in it where it extends beyond the occlusal surface. Between these slits, the gold strips are bent down over the occlusal surface where they will overlap one another. After soldering, the gingival margin is trimmed and the crown is

ready to be set in guttapercha. If the tooth is unusually sensitive, the crown is taken off again and lined with carbol-eugenol before resetting on the tooth. The patient may now be dismissed with a feeling of comfort.

If a broken bridge has been taken off to be replaced with a new bridge, the former may be quickly repaired and reset with temporary filling material to serve until the new bridge is ready. No investing is necessary. The broken ends are cleaned and, with the aid of some zinc chloride, soft solder — ordinary tinsmith's solder — is allowed to flow into the joint. This technic serves very well for closing any joint in a crown or bridge which is to be worn temporarily.

A wax pattern is so fitted to the kryptex die that it slips off and on with ease. It is allowed to extend about 2 mm. or a little more beyond the finishing line or beyond the point where the finished crown is intended to go. If the copper cap impression were a trifle short at the root end, the kryptex die might be trimmed away a little at this point, to lengthen the wax pattern for the tray. This wax pattern need not absolutely fit the die. In fact, it should slip on and off with ease. No attempt is made to reproduce the anatomic form of the tooth. The sprue former is arranged in a line parallel with the walls of the cavity or crown and the pattern mounted as close to the crucible former as possible. It is invested with a good deal of expansion, eliminated when ready and cast in sterling silver, which may be obtained in convenient sizes for this purpose; or coin silver may be used.

For the three-quarter crown, the wax pattern is also fitted so that it slips off and on with ease and is allowed to extend about 2 mm. or a little more beyond the margins or the point where the finished crown is intended to go. On the labial or buccal surface, the wax pattern extends from the incisal or occlusal surface toward the gingival margin to about the center of the bulge on the tooth. When these castings are made, they are trimmed out with stones or burs so that they go on and off the die with the greatest ease. Even then, they may have to be trimmed further when tried on the tooth since the dies that they are made from are often far from accurate. The labial or buccal overlap on the gingival half of the three-quarter crown margin is trimmed away so that it does not touch the tooth when the casting is removed. The amount of overlap at this point is reduced to a minimum. These castings are to be used as trays for taking modeling compound impressions of the abutment teeth and later on to be filled with amalgam for dies.

Why go to all this trouble for making castings for trays? Unless the walls of the tooth beyond the cavosurface are absolutely parallel or do not form a constriction (and that is never the case), the compound or other impression material will of necessity extend into constricted areas. When the copper band or cap serving as a tray for this compound is withdrawn, the compound beyond the constriction must be forced outward to get by. If the band or cap has not absolute rigidity (and those used up to this time have not), it will be forced outward by the compound, and the impression will therefore be distorted. Thus, a wax pattern made on the die will not fit the tooth the die is copied from. On the other hand, if the silver tray has absolute rigidity as compared with the chilled compound, the compound beyond the area of constriction will draw if it is not absolutely hard when removed, and it will break if it is hard. This break usually leaves

a definite outline of the margin; and, further, the tray comes so close to touching the tooth over large cavosurface areas that a distortion is unlikely even if the tray is removed before the impression is absolutely hard.

Having made the trays, we are now ready to take the impression. The tray is heated and filled with hot stick compound and the tooth coated with soapsuds. The tray and compound are reheated and forced to place. If the tray fails to go to place, or if a slight deficiency appears near the margin, a correction may be made before the impression is replaced and reheated. The best results are obtained by having the compound hot enough to go to place the first time. When the compound has to be reheated on the tooth, it should not be overheated for it will blister on the surface inside owing to the presence of moisture on the tooth. These blisters do very little harm in a practical case for they can be smoothed over on the die. They seldom involve the margin. A slight defect may be corrected with carding wax before the impression is replaced on the abutment. If this is done, the compound need not be reheated. The position of the tray in relation to the tooth is noted carefully before the impressions are taken. Thus, the minimum of time is lost and the tray goes to place as quickly as possible before the compound starts to chill. Here, the excess lug in the casting will be found invaluable in forcing the impression to place as well as in removing it. The impression is examined carefully for defects. Every margin and shoulder should show definitely, and there should be no drawing within the cavosurface of the impression. If there is, the abutment tooth is examined for undercuts. The soapsuds are washed from the impression and it is ready for making the die.

The ends of a small piece of brass rod about a half inch in diameter are tapered with a file and the surfaces smoothed. Around these tapered ends, some pink baseplate wax is folded and the joint sealed. The larger end of this wax pyramid is fitted over the gingival end of the impression and the joint sealed with wax. This wax pyramid should be in line with the sprue on the tray, which, if correctly placed, is in line with the direction of withdrawal of the wax pattern from the abutments. The reason for this will be obvious when the finished wax bridge is withdrawn from the dies. If the bridge could not be withdrawn owing to a slight undercut, the dies will come out with the wax bridge. These dies can then be withdrawn from the wax bridge one at a time. This bridge is imbedded in a rubber ring filled with plaster of Paris so that the small end of the wax pyramid is exposed. The plaster is allowed to set thoroughly before packing with amalgam.

If the amalgam is properly packed, the root can be trimmed down and polished without clogging of the stone or the disk. The amalgam is mixed thinly in a mortar for three minutes or more, with a brisk motion. A small pledget of amalgam is placed in the impression and jarred to place by tapping the impression vigorously on the bench. One pledget of amalgam after another is employed until the cavity is full, the jarring continuing. If there are any very acute margins on the abutment, special care is necessary in jarring the amalgam in order to reproduce the sharpness on the margins. When the cavity is filled, the excess mercury is wrung out from some more amalgam, a pledget placed on the top and, with one finger on it, it is jarred vigorously. This is repeated until no more mercury

comes to the surface, but the operator must be sure to jar the filling vigorously. The soft amalgam that has been squeezed out can be wrung out and, with it, the root built to a tip. We must never use a pledget of well-wrung-out amalgam until the cavity is nearly or quite full as it may bridge a space and leave a void. That is especially disastrous at a margin. The amalgam die is allowed to set for several hours before removal from the impression. Overnight is preferable.

The plaster is cut away and the wax form peeled off from the amalgam root. Moderately hot water is allowed to flow over the amalgam root, whereupon the die can be withdrawn quickly and with ease. Furthermore, the impression will remain practically intact. We must be sure to withdraw the die from the impression before the heat in the die has had time to penetrate into the compound; otherwise, the impression will be distorted. It must be kept in mind that these impressions are to be used again in the transferring of the dies to a plaster model. Therefore, the less distortion in the compound the better, and the easier the work becomes later on.

If the brass forms are properly shaped and smoothed, the amalgam roots will be smooth to start with. Only a slight trimming will be necessary near the gingival margin and at the tips of the roots. The flattened surfaces will permit a definite seating in the plaster cast.

The dies are dipped in melted cocoabutter and then wiped as dry as possible and free from any signs of it. A jar of cocoabutter is kept in a warm and convenient place for this purpose. We are now ready for the wax pattern, and this can be built on the die without any fear of the wax sticking to the die, even if it is melted on, or of cocoabutter being left on the wax pattern. With this treatment, it is possible to wash the die with soap and water, thoroughly dry it and melt wax on it without leaving any wax sticking to the die.

The die is warmed in water at about 100 F. If the die is warm, the wax will not wrinkle when forced down over it. If the die is for a crown, we quickly force a matrix down over the softened wax and tighten the matrix holder, forcing the wax to place with one finger. Then we drop it into a glass of cold water, ice water if possible. For three-quarter-crown or inlay dies, it is not necessary to use a matrix. The fingers serve a better purpose and do not require so large an excess of wax; but, in all cases, we drop the die and the wax into cold water before carving the pattern.

After the wax patterns on the dies are allowed to reach the temperature of the room (it may be 70, 80 or 90 F., depending on the time of the year), they are carved and all margins are corrected. The margin correction is made as follows: A wax instrument warm enough to soften the wax but not to melt it is placed a millimeter or more from the margin; the intervening softened wax is forced toward the margin, and the depression thus produced is then filled with melted wax. When this has cooled a trifle, the whole mass of soft wax is compressed toward the tooth. This technic is very good for correcting any accessible margin of wax and tooth in the mouth. Because this wax is softened but not melted, it will not stick to the tooth, and, further, it will not draw away from the moist tooth as melted wax does.

If in correcting the wax margin on the amalgam die, a piece of wax should be torn out, we may safely replace it with melted wax without any fear of

its sticking to the die. The cocoa-butter will prevent that, and none of it will be found on the wax pattern.

These patterns may now be tried on the corresponding teeth in the mouth. If there is a fairly well-marked finishing line for the crown, the wax pattern will be found to be correct except as to occlusion. This had best be corrected now and checked with the bite later on. It may be corrected when the whole bridge is waxed on the model. If there is no definite finishing line and the wax pattern should be found to be too short or too long, the correction is made at this stage. The line at which we wish the crown to end is then marked on the die. With the three-quarter crown, conditions will be found a little different. If the compound impression is removed from the tooth when absolutely chilled, the margins will be fairly well defined. If the impression were removed before it was absolutely chilled, there would not be so well-defined a guide at the gingivobuccal and gingivolabial angles, but there would be an imperfect impression of the tooth beyond these points. Moreover, the cavosurface angle of the die would be correct as far as the finished casting goes. If the wax pattern were placed on the tooth, it might be found to extend over the margins at the gingivobuccal and the gingivolabial angles. This overhanging wax on the tooth is cut off and the pattern replaced on the die. It may appear to be short, but it will fit the die well as far as it goes. The die is trimmed close to this wax margin and we will be ready to proceed with the bridge. The pattern may now be removed from the die to the tooth and back to the die without any distortion and we need not check it again. Moreover the pattern will fit tooth and die equally well. With inlays, the amount of correction is very small, but the pattern will always fit the cavosurface angle of the two equally well. Where a tooth adjoins the bridge abutment, it is well, at this point in the work, to establish contact with it on the wax pattern. A little wax is then added to the contact point before investing, to allow for polishing. We are now ready for the transfer of the dies to a plaster model. The technic in use for this transfer at the present time is far from accurate. I have never succeeded in making one accurately with it and I doubt that anybody else has done so.

The silver trays are now replaced on the dies. If they fail to go to place, they are placed in moderately warm water for a short time and the dies forced to a firm seating. In most cases, they are there already. If the dies are too firmly seated in the impressions, we may remove them by gripping the sprues on the impression trays with a pair of pliers and tapping the pliers with a hammer. Every bit of overhanging compound is cut away from the impression. The dies must go in and out with ease, but are seated firmly. At this time, it may be necessary, for lack of space in the molar region, to cut the excess button from the molar impression tray. If the sprue is short enough that the button is very close to the impression tray, there may be room enough in some mouths to leave it. If it has to be removed, we roughen the silver impression tray with Joe dandy disks so that the plaster in the impression will grip it tightly. With teeth farther toward the front of the mouth, it is well to leave the buttons on the impression trays. When the impressions have been properly fitted to the dies, they are placed on the abutments, the operator assuring himself that they are firmly seated. If the gums should force them off the teeth, that part of the tray that goes below the gum lines

is trimmed off and it is again determined that the dies can be firmly seated on them before we proceed. No particles of food or débris are to be left either on the tooth or in the impression tray, to prevent a definite seating of the tray on the tooth. It may be necessary to seal the three-quarter crown or inlay impression trays to the abutment teeth with a little sticky wax. When the silver impression trays are in place on the abutment teeth, all exposed undercuts on the buccal and lingual surfaces of the abutments are filled in with wax so that the plaster impressions can be withdrawn with ease. If the tooth beyond the bulge on an inlay or three-quarter crown abutment were left exposed, the plaster impression could not be removed.

A tray of proper size is chosen. The lingual aspect of the natural teeth is studied to determine whether there are no undercuts. If there are, they are filled with plaster of Paris and allowed to set. From the cuspid, or first abutment, forward and around to the opposite side, the tray is bent outward to expose the natural teeth when it is in place. After instructing the assistant to be ready with a pledget of soapy cotton, with which to coat the remaining natural teeth, we proceed to mix the plaster for the impression. Just before the impression plaster is forced to place, the teeth and plaster cores are coated with soapsuds and the silver trays are tested to see that they are secure. When the impression tray is forced to place, all the plaster in front of the natural teeth is wiped out with the index finger before it starts to set. When hard, the small particles of plaster between the teeth are picked out and the surfaces of the teeth cleaned with wet cotton. Another mix of impression plaster is made, the teeth and surrounding plaster are recoated with soapsuds and filling in is done with another mix of plaster. A little soft plaster is carried to place on a spatula and forced well to place, the patient's lip being used as a plunger. Filling in is continued. When the plaster has hardened, it can easily be removed in one or two pieces. If there are no undercuts, the remaining part of the plaster impression carrying the silver impression trays can be easily removed. This part of the impression must be held firmly in place until its final removal, which must not be carried out until it is cold, as otherwise the compound would be distorted in the tray. All the plaster cores, if any, are now fitted and waxed to place. The dies are slipped to place in the impression trays and waxed so that they are held firmly. There must be no particles of plaster or other material to prevent the dies from being firmly seated. The greatest accuracy is necessary in every step of the transfer, and especially is this true if there are more than two abutments. The separating medium is put on and the model poured.

When the model has been opened, we are ready for the bite. It is here that difficulties have arisen in the past; and it is here that finger skill, the personal equation and intuition have been brought into play to the highest degree. It is here that we have followed the advice of this person or that one who used a particular articulator and a highly specialized technic for taking the bite, checking and "double-checking" in order to reach perfection in balanced occlusion, only to finish by attempting to grind the bridge to occlusion in the mouth. Then comes the disappointment to find that we have ground too much in some places and that the bridge does not function properly when put to the real test in mastication.

As far as fixed bridgework is concerned, all this guesswork is to be done away with. We may safely forget all that we have learned about bridgework as far as articulation is concerned and we may cast aside all modern articulators; and when we have done that, we are going to obtain better articulation or occlusion than we have ever obtained with the use of any articulator. We are going to obtain well-nigh perfect functional occlusion; and that has never been accomplished before except, possibly accidentally, by means of spot grinding after the bridge was supposed to be finished. We are going to accomplish this result with a technic which requires no great amount of finger skill and absolutely no personal equation, for we are going to employ the human jaw as an articulator; and with it, we are going to establish the exact position, outline, curves and facets on the occlusal surface of the bridge which are necessary to meet all positions of the opposing teeth with every movement of the mandible.

On the model, we build up in moldine a mold for casting a low-fusing metal bridge, then cast it. This bridge need not reach the gum line and need not have any occlusal surface to fit the opposing teeth. In fact, it must not touch the opposing teeth when placed in the mouth. All that is required is that it rest rigidly on the dies and has a broad flat occlusal surface. We transfer this to the abutments in the mouth and see that it rests securely and does not interfere with the occlusion in any position of the mandible; remove it and cover the occlusal surface with some hot compound (a low heat compound is preferable); quickly replace it on the abutments and ask the patient to close. When the bridge is slightly cooled, we ask him to chew on it and have him reproduce all the movements of the mandible that we can think of. Now we remove the bridge and relieve the whole occlusion a trifle. The foregoing step may be eliminated if the low-fusing metal bridge is just short of occlusion. If the bridge extends to the posterior tooth in the arch, the compound is not relieved so much on the posterior abutment. We test again until the patient can find no interference nor any suggestion of interference in any movement of the mandible.

The bridge is removed, covered with hot wax and replaced on the abutments. Again, we ask the patient to close and, when the wax is slightly cooled, chew, on both sides of the mouth. We ask him to find a point on the bridge where there is interference, leaving the room so that he will be less conscious of what he is doing. There will be no interference, for no wax will stand up under the stress of mastication; and the bite will not be closed too much, for the compound cusps will prevent it. Fifteen minutes should be the limit of time necessary for building up the bite and obtaining the desired surface.

When the patient gets through chewing on this wax surface, what have we? A path worn in this wax occlusal surface by the opposing cusps while in normal function. Let us call this the functional occlusal path. We have a bridge with a wax occlusal surface on which every cusp or sulcus remains in contact with the opposing sulcus or cusp, when within range, with every movement of the mandible, provided there are no interfering cusps on the natural teeth not included in the bridge. We have a bridge that functions accurately; a bridge that is in accurate balance, cusp to cusp as well as side to side; a bridge on which there is not a single point on the occlusal surface which can in any way interfere with an opposing cusp in any movement of the mandible whatsoever; a bridge on which there is not a single point on the occlusal

surface which will not meet an opposing cusp or sulcus in some of the movements of the mandible; in other words, a bridge which functions as nearly perfectly as is possible in that particular mouth, but with a wax surface.

When we have reproduced this in the permanent cast gold bridge, we shall have nearly perfect functional occlusion; and that is a comparatively simple matter.

The trial bridge is replaced on the model and the bite poured with proper markings to maintain it securely. A plain line articulator will aid in maintaining the true relations of the two models to each other. This transfers the functional occlusal path to the opposing model. The surface thus produced is treated with melted cocoa-butter and the excess is wiped off. The wax patterns are replaced on the dies, the occlusal surface is reheated and the two opposing models are brought together, and thus the functional occlusal path is reproduced on the wax pattern. We need then only carve to form and perfect the carving of the abutment patterns.

While we may choose the facings and aline them before the bite is poured, now is the more logical time to do it. The facings are arranged on the model and tied together and to the abutment patterns with some pink baseplate wax. This is transferred to the mouth, checked for esthetic values and replaced on the model and a matrix poured. In the past, we have been forced to make the gold cusps heavier than necessary in order to allow for possible grinding in perfecting occlusion. Even then, we have, in the end, often found the gold cusps too thin to protect the porcelain facings against the stress of mastication. With this technic, we need have no fear of that. The gold cusps are made as heavy or as light as we wish them to be in the finished bridge. It will not be necessary to grind them down to perfect the occlusion. All the cusps will function correctly from the start and only a slight amount will be taken off in the finishing, polishing and grinding in.

Before waxing up the dummies, we grind the occlusal or incisal end of the porcelain facings to allow the same thickness of wax for protection on all. One dummy is then waxed up at a time and replaced against the matrix. It is held there firmly; the wax on the occlusal surface is melted, and the two models are brought together. The occlusal form is then carved to conform with that of the other corresponding teeth in the same mouth. Too deep and too much carving is avoided. We refrain as far as possible from disturbing the functional occlusal path. Comfort and service to the patient are of far greater importance than beautiful occlusal carvings.

If any of the dummies should be thrown out of alinement, the occlusion will not be affected as long as the occlusal surface is in the functional occlusal path. The appearance of the occlusal surface will be greatly altered.

A few words about carbon points and pin holes if pin facings are used: Carbon points caused much trouble and can be eliminated. For the last year, I have been experimenting with German silver and soft steel pins to replace the carbon points. Soft steel wire may be dipped in shellac and heated to cherry redness and, when cooled, used for pins instead of carbon points. In most cases, they can then be withdrawn from the cast bridge. German silver pins are a little more liable to stick or be fused to the gold. Five minutes will suffice to eat out these pins if the bridge is placed in nitric acid.

In the anterior teeth, if the pins on the facings go through the wax, no pins

are needed in the holes. The investment takes their place.

I recently learned of another technic which can be used very successfully in bicuspid and molar dummies. The facings are removed from the wax dummies. Openings are then made into the pinholes from the gingival aspect to the wax dummies. These holes are connected and the facings are replaced. When the investment is made or the facings are cemented to place, these holes are easily filled with investment or cement. A more secure setting of the facings in the finished bridge should be obtained with this method than with the old one, for the small pinholes are never completely filled with cement.

I obtained the pinhole technic from W. I. Ferrier, of Seattle, and, he said, I believe, that he obtained it from Dr. Hollenbeck, of San Francisco. It was in some measure through Dr. Ferrier that I was led to develop the technic for functional occlusion in bridgework.

When the occlusal surface of the first dummy has been obtained as described above, the facing is removed and the pinholes are opened. If the wax dummy is for an anterior tooth, where the pins will come through, it is well at this time to run a test pin, 20 gage, through the hole because the pins in the facings vary somewhat in size. The lingual form is carved and the dummy is waxed to the adjoining wax abutment. This is repeated with all the dummies. One point is always allowed where the wax is not united between any two abutments in any bridge. This is true even if the abutments adjoin one another without any dummy between them. Before going on, we must be sure that the facings will withdraw with ease from the wax and that the pin openings in the wax pattern are as large as the pins to be inserted.

Now we place the sprue former at a point half way between the ends of the bridge, at a slight angle toward the lingual aspect. This will allow us to hold the gingival as well as the buccal surfaces upward while vibrating the investment. It will also make it easier to paint the occlusal surfaces of the wax pattern. One sprue former is all that is necessary for a five-tooth or six-tooth bridge built in a nearly straight line. If the bridge should extend part way around the arch instead of in a straight line, an auxiliary sprue circling in the opposite direction is necessary to allow for even expansion and shrinkage.

Some small pieces of ice and a thermometer are placed in a bowl of cold water, a temperature of 50 F. being maintained in the water if possible. The model is placed with the wax pattern in the water and allowed to remain there until thoroughly chilled. It is removed from the water and the moisture quickly blown from the open joint. The latter is closed with a hot wax spatula and some hot wax, and replaced in the water immediately. This is repeated with every open joint until they are all closed. After the first joint has been closed, it is kept out of the water for as short a time as possible. If one of the wax patterns appears at any time to rise from its seat on the die, we know that the proper temperature has not been maintained, that the waxed bridge has become warmer than it was when the joint was sealed. We then open the joint and try again. If the wax pulls away from the margins on the three-quarter crown, we know that it was not thoroughly chilled before the joint or joints were sealed. With care, we can correct them at this stage. This pulling away from the margins often occurs when the dummy is waxed to the three-quarter crown. It is then cor-

rected before the whole bridge is chilled. Because of this fact, it is well, as far as possible to do the final sealing between the different parts of the wax bridge between dummies rather than between a dummy and a three-quarter crown. After two or three attempts, we find it quite easy. With the model out of the water for short intervals, we remove the facings with sticky wax and place the German silver points in the pinholes in the anterior teeth. Now, the wax pattern is removed from the dies. If the walls of one die are quite parallel to the walls of the others, the bridge pattern cannot, of course, be removed. But if the wax pyramids made to shape the roots were properly placed, or if they extended in the direction of the undercuts, the dies could easily be removed with the wax pattern. They could then be removed from the bridge pattern individually. This would not be the case if they extended too far in the opposite direction from the undercut. In that case, it would be necessary to cut out some of the plaster to avoid breaking of the wax pattern. If the casting of bridges becomes a laboratory procedure, which I believe it will in time, working cabinets maintaining a temperature of 50 F. will be installed. (This temperature may be slightly altered in time.) Electrically heated wax spatulas could be used and the work of assembling would become very simple. A mark is found on the ring and the ring placed on the crucible former so that this mark is farthest from the bridge pattern. When the mold has hardened, we may safely drill a hole in the investment near that mark on the ring for the insertion of the bulb of a thermometer, without any danger of interfering with the wax pattern. This is done on the crucible side of the mold.

We fill the small mixing bowl one-third full of water (room temperature) and set aside. It does not make much difference what the temperature of this small amount of water is, for it will be the temperature of the room before we are through with it. After allowing water at a temperature of 140 F. to run on the large mixer and bowl, we place three measures of outer investment in the warm, wet bowl. We then place three measures of water at 140 F. in the investment, place the hot wet mixer in the bowl and mix for five seconds at low speed. This is then placed where it will maintain its temperature until poured.

The inner investment is mixed as follows: Gradually, inner investment is sifted into the water in the small bowl until no water appears on the surface. The bowl is jarred a trifle and more investment is sifted in, until there is little tendency to flow when the bowl is tipped a little. This is allowed to remain for half a minute and then mixed for five seconds at slow speed on a lathe. The cavosurface angle of the pattern is painted by forcing the investment ahead of the brush, down one side and up on the other, which will tend to avoid air bubbles. If not using any pins in the wax dummies, we force the investment in from the gingival aspect until it comes out through the pin holes. When the cavosurfaces and the porcelain facing surfaces of the pattern have been covered with inner investment, we vibrate by rasping with a vulcanite file for a few seconds and then finish the painting, making sure that no air bubble is trapped at the juncture of the crucible former and the sprue former; which would enlarge the opening for the gold to flow in. A hot ring kept at a temperature of about 200 F. is placed on the crucible former and the outer investment spatulated for one second,

and poured. It is then placed in a water bath at 120 F., and allowed to set for one hour, if possible. Longer will do no harm. Forty minutes may suffice, but the investment gets harder the longer it sets; and the harder it is, the better.

When the investment has set, the crucible former is removed with a rotating motion. The sprue former is removed in the same way. Near a mark on the ring noted beforehand, a hole is drilled in the investment close to the ring big enough to fit the bulb of a thermometer. This mark is at right angles to the long axis of the bridge.

The second size boiler is filled with water at 125 F. and the mold placed in it with the sprue outward. The top is screwed on and it is placed over a heater which will bring the water in the crucible to the boiling point in about eight to ten minutes. The process is continued until the water is boiling well. Boiling is allowed to continue for two minutes. The boiler is removed from the heater and, by holding it at an angle, we allow cold water to flow on the base. We then turn it upside down and continue the flow of water until the boiler is cool enough to handle, turn it right side up, unscrew the top and remove the mold. We may now set the mold aside for an indefinite time or we may start moisture elimination at once. The mold is placed in an oven which will maintain a temperature of from 300 to 315 F. when the moisture has been eliminated. We should have facilities for inserting the bulb of a thermometer into the hole in the investment, in order to be sure of the temperature. Five hours or longer is advisable for complete elimination in a five-tooth bridge mold. I often use an overnight elimination period. I have found from 305 to 315 F. a very good temperature at which to cast. If the high heat technic can be developed to a point where we are absolutely sure of the expansion, it may displace the low heat technic for cast bridgework. Only time can tell.

The gold is cut up and the casting machine ready before the mold is taken from the eliminator. A very hot flame is used for melting the gold. I have found oxygen and gas very efficient. The gold is melted to a high state of fluidity; then more and again more before casting. After some failures, I learned to melt the gold enough. I am speaking now of bridges; and the larger the bridge, the higher the state of fluidity of the gold must be before casting. The secret of good bridge casting is perfect elimination of wax and moisture and an easy flowing gold.

When the bridge has been cleaned up carefully, any gold nodule or other imperfection which might prevent any of the abutments from being seated on the individual dies is removed. Every abutment of the bridge is relieved to within a millimeter of the margin with a small gem-point stone or bur. If each abutment can be easily seated on the corresponding die, there should be little or no tension when the whole bridge is placed in position on the amalgam dies. I have yet to see the first case in which the tension on the abutments could not be most favorably compared with that on even the best fitting soldered bridge. In fact, I have yet to cast my first practical bridge which could not easily be seated on the rigid amalgam dies on the plaster model. That is more than could ever be said of any of my soldered bridges. The bridge may now be polished, with the exception of the margins.

It is here that certain questions come to mind. Suppose we are unfortunate enough to have a rounded margin? Or

suppose a small piece of investment should get into the mold and lodge at a critical point along the margin? Would we not then have to cast the whole bridge over again? Those are questions which we are justified in bringing up. Those are arguments which have been met before. Several men have said to me "I should certainly much rather cast an inlay or a three-quarter crown over again than to cast a full bridge over again."

First, let me say that there is no more reason for a failure in a bridge casting than in a single inlay casting; in fact, there is less; for some inlays are cast with the quick elimination method, where a failure might be possible if attention were called away at the time when the casting should be done. With bridges, all molds are eliminated by the slow process. There is a minimum time that the molds should be subjected to given temperatures before casting. If we cut that time short, failure will result. If we run overtime ten or fifteen minutes or ten or fifteen hours, it apparently does no harm.

If we have a rounded margin or a defect at a margin in a bridge, we are in exactly the same position that we would be in if we had a similar defect in an inlay made by the direct method, with one exception. In the case of the inlay, we would have to await the return of the patient before correcting the defect or making the inlay over again; in the case of the bridge, we would correct the defect and forget about it before the return of the patient, because the correction could not be detected when the bridge was polished.

There are two methods that can be employed for making these corrections, depending on their size and position: First, the bridge must be absolutely seated on the die if the correction is to be made on the corresponding abutment. If the defect is a rounded margin of some extent, a piece of platinum foil is placed over the cavosurface angle of the die next to the defect and the bridge seated over it. This will serve to hold the platinum in place. The platinum is then burnished well over the margin of the die and the defect filled in with sticky wax. We then invest, boil out the wax and allow the solder to flow on; then trim away the platinum from the inside. After polishing, this correction cannot be detected.

In case the defect is due to a piece of investment entering the mold and is well-defined, a little hole is drilled into the casting 2 mm. from the defect. With an inverted cone bur, we undercut this hole and cut an undercutted groove between the hole and the defect, place the bridge on the dies, then take a good sized piece of soft gold foil and pack it into the hole and the groove, allowing it to extend well out over the defect. We then burnish it into the defect and over the margin, and dip a small piece of gold solder into some borax paste and lay it over the gold foil. In flowing this solder, care must be observed to throw the heat on the bulky part of the abutment or other part of the bridge in repair, back from the margin. If heat is thrown directly on the margin, we may melt the gold foil before the solder or may draw the solder over the margin. If this is done properly, the correction cannot be detected.

If we should be unfortunate enough as to drop a facing and chip out a piece, we level off the ragged end where the piece is chipped, then fill in with gold foil the opening produced by the lost piece of porcelain according to the foregoing technic, flow the solder, and we are as well off as if it had never happened. Ten minutes is the limit of time

that it takes for we do not have to invest the bridge.

If the margins anywhere should show a flaring away from the dies, they may be brought in close contact with a foot plugger and a mallet. This should be done before the bridge is polished.

It is well to check up on the margins while the patient is in the chair. We may find a little overlap of the gold on the buccal or labial margins near the gingival and this must be removed while the patient is in the chair. We mark the gum line on the gold crowns if there are no definite shoulders on the dies to finish to, thus avoiding trimming the margins back too far when polishing the bridge on the dies. The depth below the margins of the gum to which the crowns should extend must depend on the extent of the free margins as well as to the tendency to constriction of the tooth at a given point. Also, we relieve any pressure from the porcelain root tips on the gum tissue and reglaze them. We now check the contact points. The occlusal force might be a trifle strong. Five or ten minutes of chewing on grinding paste should suffice to give accurate functional occlusion. We do not touch any cusp with a stone unless it be where the sprue was attached, and, if there, we check with the opposing surface on casts, never in the mouth. With the exception of the final polishing on the buccal or labial margins, the bridge can now be finished on the amalgam dies.

When I slipped to place in the mouth the first bridge that I made by this technic and saw it function perfectly with every movement of the mandible, and I had the pleasure of having the patient tell me that it felt fine, I received the greatest thrill that I have ever had from anything that I have ever accomplished in dentistry, and I have been getting nothing but such thrills ever since that first experience.

THE IMPACTED MANDIBULAR THIRD MOLAR*

By BOYD S. GARDNER, D.D.S., Rochester, Minn.

IN REFERRING to the impacted mandibular third molar, I have in mind those more difficult to extract. It is well understood that the easier of these impacted teeth may be removed almost "sight unseen." This is particularly true of teeth of younger patients, even though the teeth may be entirely covered and roentgenologic evidence may point to difficulty.

Before the use of roentgen rays became so general in the practice of dentistry, the study of extraction of teeth was more a study of the specimen extracted. In dental colleges, the demonstrator of extraction would have the tooth passed from student to student for examination, rather than have them observe the socket from which the tooth had been removed. It was not

*Read before the Section on Oral Surgery, Exodontia and Anesthesia, at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

uncommon for an "extracting specialist" to give a table clinic before a dental society, and display different types of teeth, many of them anomalies. Such teeth were interesting from an anatomic standpoint, and represented successful operations as far as the term "successful" was applied at that time. In those days, a large percentage of the dentist's patients left his office with roots and pathologic conditions which he did not know existed, and consequently failed to treat. Also, many unerupted, impacted and supernumerary teeth were overlooked.

The majority of these malposed mandibular third molars were only partially impacted and therefore comparatively easy to remove. They were revealed only by clinical examination, and caused more local disturbance than do those which can be found only by roentgenologic examination. They also caused more postoperative discomfort, as many such teeth were removed in acute or semiacute conditions.

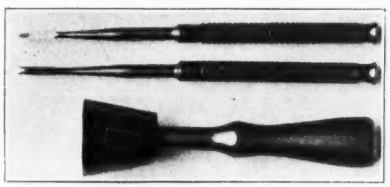

Fig. 1.—Improved mallet with two chisels most commonly used.

Since those early days, more attention has been directed to the study of postoperative conditions, with particular attention to gum tissues, bone, blood vessels, nerves and the remaining teeth.

As time progressed, the use of roentgen rays became more popular, and impacted teeth more difficult to extract were discovered. Oxygen was added to nitrous oxide and, by this combination, the breadth and quality of the anesthesia were improved, the operator having much more time for the extraction. The number of extracting specialists rapidly increased, and numerous ideas were developed for the removal of this particular type of tooth.

Some operators made use of drills, burs and even disks for the removal of the crown in whole or in part. This was usually done under local anesthesia by the infiltration method or in combination with the use of nitrous oxide. Other operators prided themselves on being able to remove the tooth in its entirety. Hand chisels were developed to cut or wedge away supporting bone, and many different types of elevators were made for the dislodgment of this particular tooth. Manufacturers were kept busy developing various ideas concerning instruments, and tons of instruments were made and sold.

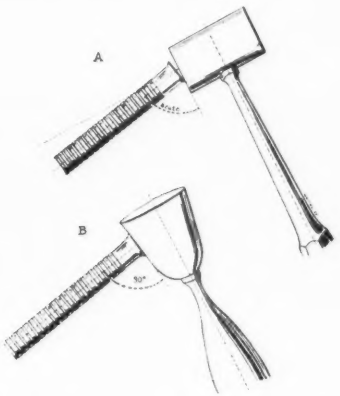

Fig. 2.—Two types of mallets: *a*, conventional type; *b*, improved type.

As the roentgen rays became more widely used, greater attention was directed to postoperative results, and especial attention was given to the second molar. Sometimes, this tooth was in-

jured, and, occasionally, it was dislodged from its socket. Therefore, in the extraction of the impacted mandibular third molar, the preoperative condition of the second molar should be carefully considered, as this is the tooth that will remain, and it should be safeguarded in every way. The root and crown formation are important points to consider. Is it a tooth that would be easy to dislodge? What is the actual condition of the crown? Might it be loosened while the third molar is being extracted? Is the tooth decayed to such an extent that part of it might be broken away? The answers to those questions should be carefully considered before operation, and the patient should be well informed as to what might take place.

Fig. 3.—Three types of impacted mandibular third molars, showing preoperative roentgenograms, restored extracted tooth, separated part and postoperative roentgenogram. In each case, the tooth had been extracted with minimal destruction of bone as demonstrated by the postoperative evidence.

All these points have been carefully considered by Winter,[1] but a hand pressure chisel technic has never been developed that can be uniformly successful. Mandibles are not the same size; neither is the consistency of the bone which supports the teeth always the same; nor can the condition be determined by roentgen-ray evidence alone. In some cases, bone is easily cut or wedged away, and, in other cases, the bone is cut with great difficulty, with practically no line of demarcation between the enamel of the tooth and the supporting bone. Moreover, it should be appreciated that to be able to execute successfully a given technic is one thing, and to teach the undergraduate dental student, or even an experienced exodontist, is another.

As teachers, we must emphasize the great difference found among patients who seek our services. We should allow our students to see the difficulties encountered, and we should make use of a technic that will be successful and safe in their hands.

The age of the patient and the amount the jaws have been used are important points to consider in predetermining the condition of the bone which is encountered when teeth are difficult to extract.

In order to select the proper anesthetic, the general condition of patients should receive first consideration. The anesthetic that will best serve the patient should be used, and not the one requested or the one that best fits the particular technic of the operator.

I have often emphasized that difficult extraction of any tooth should be a

1. Winter, G. B.: Impacted Mandibular Third Molar, St. Louis: American Medical Book Co., 1926.

definite procedure, almost as definite as the preparation of a cavity for a filling. Obviously, such a statement could not be true unless the operator is actually able to visualize each step in the procedure. Accordingly, in the teaching of such work, block anesthesia has an advantage over others, because hemorrhage can be more easily controlled. If the operator has had sufficient experience, he may use a general anesthetic with equal success in at least the less difficult cases.

It is impossible to extract any tooth without some degree of trauma, but it should be minimized and tissues handled with the same care as in general surgical operations.

The preoperative medication of the mouth is receiving much more consideration in the last few years, and the work of Vastine,[2] Keilty,[3] Krogh[4] and others on subgingival therapy has stimulated thought in this direction. Though better results will obtain if operators are permitted to carry out such treatment for a week or ten days before operation, it is appreciated that, in many cases, this extra time is not allowed. Krogh,[4] at the recent meeting of the American Dental Association, gave a most gratifying report of cases in which premedication was instituted as compared with cases in which such treatment was not given.

Assuming that the anesthetic that will best serve the patient has been selected, the instruments have been sterilized, the operator is properly gloved and gowned and the operating-room toilet is complete, the next consideration is the approach to the tooth to be extracted. The field of operation should be well walled-off with sterile gauze, and, if the tooth is completely covered, it is necessary to make an incision in order to retract a flap. The retractor should be an instrument which will accomplish the purpose for which it was intended with minimal trauma to the flap, and the incision should be made in such a way that the flap will have an ample blood supply. The situation and type of incision are not determined by roentgen-ray evidence alone, the clinical findings also being considered. There are various types of incisions that are equally satisfactory as far as access and visibility are concerned, but to avoid its sloughing, the flap must have an adequate blood supply. The incision should include the periosteum, as it is advantageous to retract the periosteum with the other soft tissues. Postoperative results are much better when the periosteum is less traumatized. This particular point has been brought out by Crile[5]; who emphasizes that injury to the periosteum results in more shock.

Several years ago, at the meeting of the American Society of Oral Surgeons and Exodontists, a committee was appointed to standardize extracting instruments and technic, but I doubt that anything will ever be accomplished along these lines. Progress is blocked to some extent by the fact that "you can't teach an old dog new tricks," but the difficult problem is to overcome prejudice.

Since the establishment of the dental section of The Mayo Clinic, particular attention has been paid to the extraction

2. Vastine, A. B.: Differential Diagnosis of Gingivitis, with Treatment, D. Cosmos, 66:13-18 (Jan.) 1924.

3. Keilty, R. A.: Infectious Factors in Gingivitis and Their Relation to Dentists, J. A. D. A., 17: 1251-1258 (July) 1930.

4. Krogh, H. W.: Reduction of Gingival Flora Preceding Operation, J.A.D.A., 19:659-665 (April) 1932.

5. Crile, G. W.: Experimental Research into Surgical Shock, Philadephia: J. B. Lippincott Co., 1899, p. 123.

of impacted teeth with the thought of safeguarding tissues left, and, in general, to reduce postoperative discomfort.

Because our patients come from many different parts of the country, we are able to determine the results of other operators and compare them with our own. Moreover, we have had an advantage over many other operators in that we have knowledge of the systemic condition of the patients on whom we operate, and we have found that variations in the systemic condition in a measure account for the lack of uniformity in results. On the other hand, we have found that the type of instruments and the manner in which they are used also have a marked bearing on postoperative conditions. We have noted the unsuccessful attempts to extract this particular tooth and the frequent removal of the second molar to allow the third molar to erupt, which has added significant and interesting data to our study.

There are two methods of creating space to facilitate the removal of an impacted tooth. The more popular method is to remove the process so that the tooth can be crowded into the space created and then lifted from the socket. The other is to create space by incising a part of the tooth. By this method, less process is cut away, and it is also advantageous in that it does away with the undesirable numbness that may result in the mental region. If the crown is lifted by the elevator, especially in the horizontal type, the roots are likely to traumatize the nerve trunk; whereas, if the crown were severed and the root or roots forced forward into the space created by the loss of the crown, such a result would be impossible unless the nerve is so held by the roots that any movement of the roots would produce a pull or compress the contents of the canal.

Thoma[6] has said: "It is better to injure the tooth to be removed than to cut away a great deal of the tissue that later has to be replaced by repair." This is in opposition to the operator who prides himself on removing the impacted mandibular third molar in its entirety. This comparison introduces the thought that I wish to emphasize: that the severing of this particular tooth will, in a large percentage of cases, facilitate its removal. Less trauma, and less postoperative discomfort are the results as, by this technic, fewer instruments will have to be used as wedges or elevators. There is less risk of mandibular fracture; in fact, fracture of either jaw has not occurred on our service in the fourteen years of practice in The Mayo Clinic.

The fact should not be overlooked that every time a lever of any kind is used, the fulcrum is more or less injured. Moreover, when an instrument is forced between the tooth and the bone, the bone is compressed by the wedging effect, which causes marked trauma in many cases. Additional trauma is also produced by forcing the tooth, whole or in part, to enlarge its own socket. For example, when a tooth is grasped with forceps and pressure is exerted for removal, the root becomes an additional instrument. The same is true when an elevator is applied, as the lifting of the crown forces the root to enlarge its socket.

For many years, operators have made use of revolving instruments to sever teeth. The late Dr. Kells[7] emphasized the necessity of keeping instruments cold in such operations so that the sur-

6. Thoma, K. H.: Management of Malposed Inferior Third Molar, J. D. Res., 12:175-208 (Feb.) 1932.

7. Kells, C. E.: Personal communication to the author.

rounding tissues would not become overheated.

About 1917, Lucas[8] demonstrated to me the use of a chisel and mallet for cutting an impacted cuspid to facilitate its removal. Since then, I have made use of the method, but I have not limited it to impacted teeth, as I have found that the extraction of many teeth not impacted can be done more easily and with far less trauma by the use of the mallet and chisel. In general, the shorter the root, the easier it is removed, as by shortening the root there will be less friction to overcome.

To use the mallet and chisel to cut the crown or any part of a tooth, it is necessary that the chisels be of a certain design and well sharpened. The mallet should also be a certain weight and shape, and the blow should be struck in such a way that the two instruments will meet at right angles. There should be sufficient mass of the mallet directly back of the point where the chisel is met, and with the angulation of this particular mallet, the requirements are much easier than with the conventional type. There should be no rubber tips on the chisels and the head of the mallet should not be made of soft material.

The assistant should not hold the mallet tightly in delivering the stroke, as in this manner it is not so effective as when loosely held. The stroke should be short, not a "follow through" as in golf. I have found the mallet and chisel illustrated in Figures 1 and 2 to be far more effective than any revolving instruments and by their use much time is saved.

The operator requires little practice to become proficient, but the method does not work out to advantage if the tooth is loosened in any way. Accordingly, one fails in attempting to sever an unerupted or impacted mandibular third molar when the roots are not entirely formed. The supporting bone is soft and the follicle is intact. Such teeth are not held firmly in the jaw.

In contrast to this condition, the teeth of patients of advanced age, particularly if the jaws have been subjected to plenty of hard work, are more easily severed. With the disappearance of the follicle, they are held viselike in their sockets with no cushion around the crowns, as occurs in youth. It is gratifying to have this condition exist, as, with other technics, it was easier to extract the more difficult teeth of youthful patients than those of older patients; whereas, with this technic, the opposite holds true.

The mallet and chisel have many advantages over revolving instruments, as an engine is not necessary and sterilization is more easily accomplished. I seldom if ever use forceps in the extraction of the impacted mandibular third molar, and the use of elevators is reduced to the minimum. Again, it is emphasized that tissue used as a fulcrum is injured, since it receives the same amount of pressure as the tooth to be extracted.

It is not necessary to hold the chisel tightly as nothing is gained by crowding it against the tooth. The operator should allow the mallet to do the work. The chisel should be in contact with the bone, tooth or root to be severed at the time the chisel is struck with the mallet. It should be emphasized that the mallet and chisel technic is different from that of the hand pressure chisel method, when the instrument must be held tightly by the operator in order to cut bone. I say bone, as I do not think that anyone attempts to cut teeth with a hand pressure chisel.

8. Lucas, C. D.: Personal communication to the author.

The amount of bone to be cut away will vary in different cases, but sufficient bone must be removed to uncover the part of the tooth where the chisel is to be applied. In other words, one does not attempt to cut bone and tooth at the same time. Seldom is it necessary to remove any of the lingual plate and no attempt is made to remove large pieces of bone in one cutting, as better results will obtain when the cuttings are small, as is illustrated in Figure 3.

By this technic, the buccal plate is not removed except in cases in which the tooth is well displaced toward the buccal surface. It is obvious that it would then be necessary. I wish to emphasize this particular point because there appears to be a misunderstanding among those who are not familiar with this particular technic. I further wish to emphasize that the correct blow from the type of mallet to which reference has been made is not so severe as some operators may think, and certainly far less annoying to older patients than when sufficient pressure is applied to a hand chisel to cut bone, especially if the mandible has been subjected to a great amount of use.

I have not found it necessary to remove a mandibular impacted third molar extra-orally, although I have operated many times when a diagnosis of "inoperable" had been made.

Postoperative treatment will depend largely on the degree to which asepsis has been carried out, and on the amount of trauma produced. It might be to the best interest of the patient if some operators would always place a medicament or a drain or wick of some kind in the socket. Other operators can replace and suture the flap in place in a large percentage of cases. Moreover, as I have mentioned, postoperative results can be materially improved by preoperative medication.

To prevent inflammation and postoperative swelling, an ice pack is applied immediately after the difficult extraction of teeth, the success of the measure depending on its immediate use. Lowering the temperature of the part prevents extravasation of the elements of the blood and lymph, a process which tends to occur more readily in an area of higher temperature.

It is obvious that the undergraduate dental student cannot be sufficiently trained in any dental college to extract teeth expertly, but he may at least be taught to have a wholesome respect for the process of extracting teeth. In other words, the problem for dental schools is to develop general practitioners good enough to find out when a patient should be referred to a specialist.

DISCUSSION

Arthur C. Engel, St. Louis, Mo.: As Dr. Gardner has stated, in referring to the simpler types of impacted mandibular third molars, any method of removal or anesthetic can be used successfully; but in the deep impactions, especially in older patients, requiring extensive bone dissection for removal of the tooth, it cannot be overemphasized that a great deal of thought must be given to gum tissue, bone, blood vessels, nerves and the second molar. For a number of years, I prided myself on the fact that I was able to remove almost any type of impacted mandibular third molar intact. The anesthetic then used was procaine. A vertical incision was made on the buccal surface of the second molar and another along the internal oblique line, retracting the mucoperiosteal flap. Then, with mallet and chisel, the bone offering resistance to the removal of the tooth was removed. In recent years, I have followed the same procedure, but have varied the method of bone dissection. Since our object at all times in removing an impacted mandibular third molar is to remove the tooth and leave the soft tissue, nerves, second molar and blood vessels, in the best possible condition, I have

come to the conclusion, after roentgenographically checking the postoperative results of many cases, that the removal of the tooth intact is not always advisable for the reason that the amount of bone to be removed can be greatly minimized in certain types of impacted teeth by splitting the tooth. It makes little difference whether the tooth is removed in its entirety or split with mallet and chisel in two or more segments, the real consideration is how little trauma has been created in the operative procedure. Dr. Gardner has given a definite and understandable description of the use of mallet and chisel. The use of disks, stones and burs is not conducive to the best results.

For many years, my choice of anesthetic in removing impacted mandibular lower third molars was procaine. In recent years, I have been using nitrous oxide oxygen in quite a number of cases. This has been made possible by using an aspirator with a suitable point and a tissue retractor with a light attached. Dr. Gardner mentioned the advantages of treating the soft tissues before operation. In many instances, it is impossible to treat patients for a week to ten days before operating, although one or two treatments with a Young rubber cup using 10 per cent chromic acid followed with tincture of metaphen will minimize postoperative complications to a marked degree.

EXTRACTION OF THE PULPLESS DECIDUOUS TOOTH*

By CHARLES A. SWEET, D.D.S., F.A.C.D., Oakland, Calif.

SINCE pulpless deciduous teeth are usually classified by general practitioners and many children's dentists with pulpless permanent teeth, extraction has unfortunately been the rule in dealing with these deciduous teeth. Little thought has been given to the possibility of their recovery from infection since few data are available.

Most of us are prejudiced against the pulpless tooth, deciduous or permanent, but because of the serious consequences attending early loss of deciduous teeth, more consideration is being given the possibilities of successful retention of these supposed foci of infection.

It would be beyond reason to say that all pulpless deciduous teeth can be retained in a healthy condition, but far too many mouths have been crippled beyond repair, by wholesale extractions, because of the economic condition of the parents.

Extraction of deciduous teeth is always indicated if (1) caries has penetrated the roots at the bifurcation; (2) two-thirds of the root or roots has been absorbed, because of normal absorption or infection, or (3) there is a fistulous opening at the gingival margin of the tooth.

In no other instance is it necessary to remove pulpless deciduous teeth; for, as far as can be observed, they have no detrimental effect on the physical development of the child and, if properly treated, show no greater susceptibility to further infection.

Economically, the retention of pulpless deciduous teeth that have been properly treated is indeed quite sound; for, in many instances, the early loss of these teeth may mean considerable expenditure of money for orthodontic treatment to correct the

*Read before the Section on Mouth Hygiene and Preventive Dentistry at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

damage that is the result of prejudice, a lack of knowledge and improper treatment.

Brandhorst[1] shows that the premature loss of teeth is responsible for 37 per cent of dentofacial deformities. Is this not a challenge to us to gain a better understanding of exposed and pulpless deciduous teeth that we may eliminate these dentofacial deformities without the use of appliances and the unnecessary expenditure of money by so many parents?

The following case is illustrative.

History.—The patient, aged 5, had pulpless upper second deciduous molars. Large fistulas were present between the margin of the gum tissue and the buccal flap of the cheek, apparently over the distal buccal root. The first permanent molars had not erupted.

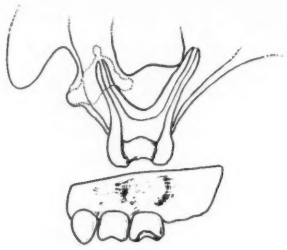

Fig. 1.—Condition before treatment.

Prognosis.—It was believed that these deciduous teeth could be successfully treated, but to eliminate the infected areas within the process the rose head bur treatment[2] would be necessary.

Physical Examination.—Examination (by Clifford D. Sweet, M.D., and H. E. Stafford, M.D.) revealed that the urine, blood and temperature were normal. The patient was underweight. The tonsils were large and cryptic, with large underlined glands. The heart gave a blowing sound, with a systolic murmur over the precordium. The general muscle tone was poor. The patient was irritable during the day, but slept well.

The physical condition was apparently due to infection and immediate attention to the oral condition and removal of tonsils and adenoids were advised.

The orthodonic examination was made by Thomas R. Sweet, D.D.S., his report following.

"The treatment and rose head bur operation is economically sound, permitting the retention of the very important deciduous molars in normal function until the first permanent molars have erupted. The estimated cost of orthodonic interference in this case, if the second deciduous molars are lost, is $300."

Treatment and Outcome.—Treatment of these teeth was started, June 9, and the work completed July 7, 1931. Figure 1 shows the condition before treatment was instituted.

One year later, July 14, 1932, a careful examination was made and the teeth were found clinically to be in a normal healthy condition and surrounded by apparently healthy investing tissues. (Fig. 2.) The first molars had erupted and were in normal position. The tonsils and adenoids had not been removed and continued to show positive evidence of infection. The weight had become normal and the appetite had improved. Marked improvement was noted in the child's disposition. Muscle tone and coloring were much better. The general physical condition showed rapid improvement, but it was decided that the tonsils and adenoids demanded immediate removal.

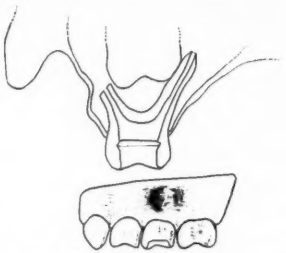

Fig. 2.—Condition after treatment.

This particular case is one of many passing through our offices, and we all concur that the large majority of pulpless deciduous teeth can be successfully treated without detriment to the physical welfare of the child. Economically, this case represented an expenditure of about $20

1. Brandhorst, O. W.: Promoting Normal Development by Maintaining Function of Deciduous Teeth, J.A.D.A., 19:1196 (July) 1932.

against a $300 orthodontist expense if the teeth had been lost. We may rest assured that no dentofacial abnormality will result from such procedure.

Many may classify the deciduous tooth whose pulp is exposed as pulpless, but there is a doubt in my mind that these teeth, if properly treated, should be so classified, since only the bulbless portion of the pulp that is within the pulp chamber is removed. Naturally, if the pulp tissue within the canal itself is removed, these teeth must be classified immediately as pulpless.

In deciduous teeth, if the pulp tissue has not been removed, after a period of about six months, it will give no indication of sensitiveness, but will bleed when touched with a sharp explorer.

Is it possible that the circulation of this tissue is restored with a destruction of the nerve tissue? This question should be of sufficient interest to stimulate research, that we may not have to depend entirely on clinical findings to prove that deciduous teeth whose pulps are exposed can be successfully treated in every instance.

The following case, seen in August, 1929, illustrates the possibility of retaining teeth whose pulps are exposed:

A child, aged 2½ years, presented seven of the eight posterior molars with the pulp exposed, most of the coronal portion of the tooth destroyed and the bite closed. Treatment and restoration of the teeth were completed November 12. Figure 3 shows the results one year later, and while the patient has left my immediate vicinity, the reports are still favorable.

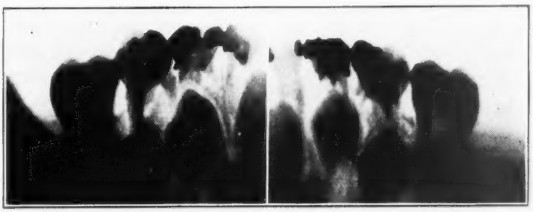

Fig. 3.—Results of restoration of seven molars with pulp exposed and coronal portion of teeth destroyed.

It is hoped that such reports as these will assist us in our judgment of deciduous teeth and that we may consider well the possible injury to the child before we extract a tooth.

THE DENTAL RESEARCH FELLOWSHIP AT THE NATIONAL BUREAU OF STANDARDS*

CONSIDERABLE interest in the investigation of the physical properties of dental materials manifested itself after publication of the amalgam report of Souder and Peters.[1] Two years after the publication of the report, the Weinstein Research Laboratories established the dental research fellowship at the Bureau of Standards. In 1928, this fellowship was assumed by the Research Commission of the American Dental Association. The activities of the fellowship since its inception in 1922 have been (1) pure research, (2) establishment of fundamental data and (3) research to set up standards or specifications for dental materials. The results of this research are reported at the annual meetings of the American Dental Association and are usually given preference as to publication in THE JOURNAL at the earliest date. The Research Commission cannot answer inquiries on subjects in active progress, as the Bureau of Standards will not permit the release of data until they have been verified and properly arranged for transmission to the Commission.

*A statement from the Research Commission of the A. D. A. of interest to dentists, dealers and manufacturers.

1. Souder, Wilmer, and Peters, C. G.: Investigation of the Physical Properties of Dental Materials (1920), Bureau of Standards Technologic Paper No. 157; for sale by the Superintendent of Documents, Washington, D. C. (10 cents).

NEED FOR STANDARDS

The Research Commission of the American Dental Association realized when it assumed the dental research fellowship at the National Bureau of Standards that the individual dentist desired definite and unbiased information regarding the restorative materials which he used in the practice of his profession. Therefore, the following plan was adopted to protect the dentist in the purchase and utilization of these materials.

THE CERTIFICATION PLAN

Specifications or standards for dental material are gradually being developed in the Bureau of Standards laboratory. To date, the following seven specifications have been developed and officially adopted by the House of Delegates of the American Dental Association. They are: A.D.A. specifications No. 1, for amalgam alloys,[2] No. 2, for inlay casting investments,[3] No. 3, for impression compounds,[4] No. 4, for inlay wax,[5] No. 5 for inlay

2. Taylor, N. O.: Specification for Dental Amalgam Alloys, J.A.D.A., 17:112 (Jan.) 1930.

3. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T.: Dental Inlay Casting Investments, J.A.D.A., 17:2266 (Dec.) 1930.

4. Taylor, N. O.; Sweeney, W. T., and Paffenbarger, G. C.: Specification for Dental Impression Compound, J.A.D.A., 18:53 (Jan.) 1931.

5. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T.: Specification for Inlay Casting Wax, J.A.D.A., 18:40 (Jan.) 1931.

casting golds,[6] No. 6, for dental mercury[7] and No. 7, for wrought gold wire.[8]

In some instances, a year or more may be required for preliminary work in order to determine what properties and data should be included in a specification.

Before official adoption by the American Dental Association, all specifications are submitted to the manufacturers for criticism and suggestions. The Commission desires to cooperate with the manufacturer in every way possible and will render every assistance that it can to prevent or stop questionable advertising which involves the use of the specifications.

A perusal of the advertising of manufacturers of dental materials will show that many are stating that their products comply with the American Dental Association's specifications. Many manufacturers are also stating the physical properties of their materials either on the package or in the accompanying literature. The Commission is very desirous that this movement be encouraged. To avoid having careless or unscrupulous manufacturers advertise that their products meet the specification when in fact they do not, the Commission desires that all manufacturers formally certify to them that they guarantee their products to comply consistently with the specifications. When this plan was first put into effect, the Commission noticed that some of the certificates had no basis in fact, and therefore developed the following system which requires sufficient data to show the properties of the material, frequency of tests, etc. For a particular material, the following data are required for certification:

Date.....

Research Commission, American Dental Association,
108 South Bldg., National Bureau of Standards,
Washington, D. C.

Gentlemen:

The undersigned as the manufacturer of the following brand of dental.....
.....* desires to have it placed on the list of materials guaranteed by the manufacturers to meet the requirements established by the American Dental Association.

We submit the attached data as evidence that this material meets the requirements.

Signed
Title
Company
Street
City State

*Insert one of the following:
1. Amalgam alloy
2. Inlay casting investment
3. Impression compound
4. Inlay wax
5. Inlay casting golds
6. Dental mercury
7. Wrought gold wire

Manufacturer's statement to Research Commission.

6. Taylor, N. O.; Paffenbarger, G. C., and Sweeney, W. T.: Inlay Casting Golds: Physical Properties and Specifications, J.A.D.A., 19:36 (Jan.) 1932.

7. Isaacs, Aaron: Mercury for Dental Amalgams, J.A.D.A., 19:54 (Jan.) 1932.

8. Paffenbarger, G. C.; Sweeney, W. T., and Isaacs, Aaron: Wrought Gold Wire Alloys: Physical Properties and a Specification, J.A.D.A., 19:2061 (Dec.) 1932.

1. Serial or lot number of the material tested.
2. Date of manufacture (year and month).
3. Physical properties obtained by standard test methods. (The information given as to physical properties was to include a brief description of the apparatus used in making each test, the data obtained, the name of the observer and the date. All test conditions were to be so defined as to permit of duplication in other laboratories. In the event that tests were made outside the manufacturer's laboratory, the name and address of the testing laboratory were to be given. As occasional tests outside a manufacturing plant do not guarantee uniform production control, some mention was required of the frequency and amplitude of outside tests.)
4. Data covering every requirement of the specification.
5. Specimens of labels, guarantees and instructions for use that are furnished with the product.

The accompanying form properly executed must accompany these data.

The Commission intends to publish a list of all materials which have been certified to them. As time and personnel permit, materials possessing a guarantee statement involving the Association's specification, will be purchased and tested by the Association's research fellowship at the National Bureau of Standards to see whether the product complies with the guarantee. Such a survey of amalgams[9] has already been made. Two lists may be published; namely (1) the certified materials which meet the specifications and (2) guaranteed or certified materials which do not meet the specification. A guaranteed material which is not formally certified to the Commission will not be listed as satisfactory even though the sample tested did comply with its guarantee statement, since its compliance might be accidental and the Commission would not have any statement on file assuring them that the product would consistently meet the specification.

9. Paffenbarger, G. C., and Sweeney, W. T.: Third Survey of Dental Amalgam Alloys (1932-1933), J.A.D.A., 20:649 (April) 1933.

RESPONSIBILITY FOR GUARANTEES

It should be clearly understood by both manufacturers and dentists that neither the Bureau of Standards nor the Research Commission approve, certify or guarantee dental materials. All such statements are solely the responsibility of the makers of the products. The Commission adopts the standards of specification and asks the manufacturers to guarantee their products to meet them.

HOW TO CERTIFY PRODUCTS

Any manufacturer wishing to certify his materials as meeting the Association's specifications should direct his communication to the American Dental Association Research Fellowship, Room 108, South Building, National Bureau of Standards, Washington, D. C. Data blanks and proper instructions will be mailed to him. The Commission desires that these data be filed as soon as possible so that the assembled material may be arranged for presentation at the annual meeting of the Commission to be held in conjunction with the Chicago Centennial Dental Congress, August 7-12.

BUYING OF SPECIFICATION MATERIAL

If the dentist demands materials which are guaranteed to pass the specification, the manufacturer will supply them. Therefore, the problem of the quality of dental materials is in a large measure in his hands.

THE DENTURE SPACE THROUGH LIFE*

By EDSON J. FARMER, D.D.S., Buffalo, N.Y.

THERE are certain broad fundamental principles which form the basis of all preventive and restorative dentistry. It is essential, therefore, that we have these concepts constantly in mind, and that dental treatment or diagnosis should always be based upon these principles that the quality of our dental service may be of the highest order. Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skilful execution. It represents the wise choice of many alternatives, a wealth of cumulative experience, and it also marks the quest of an ideal, after necessity has been satisfied and usefulness achieved.

It is my purpose to lay stress upon one of these fundamental concepts; the subject of occlusion and articulation of the teeth, and, more particularly, a consideration of the denture space. These two factors in dental work are so intimately related that it is almost impossible to consider them separately.

While the subjects of occlusion and articulation have had more than their share of consideration in dental research and literature, the denture space has had but scant notice in comparison. In fact, the very mention of the words denture space usually calls to mind the image of an edentulous patient, and the subject of prosthesis. It is hoped that what is here offered will change this tendency so that the denture space will receive that consideration which it rightfully deserves; and that, by this means, more favorable conditions will be maintained in dental treatment, so that, when the necessity for full denture replacement arises, the most favorable conditions will exist for these restorations.

Foundations for the denture space are laid during the early developmental stages. The formation of the dental ridges is one of the early factors in establishing the denture space. Conjointly with ridge growth are embryonic tooth growth, formation of bony and soft structures that will ultimately result in the establishment of boundaries and determination of the nature and characteristics of that cavernous portion of the mouth, part of which becomes the denture space for natural dentition. In this early stage, the denture space is influenced by nutrition, habit and regular eruption of the teeth; with corresponding normal development of the hard and soft structures contingent to the dental mechanism.

The eruption, alinement and maintenance of the deciduous teeth are next to be considered. Here, we have vital units of important bearing on the denture space. At this time, definite ridge relationships are being established, with corresponding structural changes, and the proper care and preservation of deciduous teeth are important. The

*Read before the Section on Full Denture Prosthesis at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

premature loss or improper treatment of these early units produces unfavorable conditions as regards denture space. It might be well to mention here such factors as the presence of pathologic tonsils and adenoids and deviated nasal septums; thumb sucking and improper postures, with consequent spatial impingement and deformity. The deciduous teeth establish conditions preparatory to the eruption of the permanent dentition; therefore, care and attention are of great import at this early stage. As the permanent teeth are gradually brought into functional position, we have an intimation regarding the course of future development.

Orthodontic treatment is often indicated here and, at this time, is very effective in relation to denture space maintenance as well as tooth alinement. It is wise always to institute corrective measures at the earliest possible time when abnormalities appear imminent. Usually, at this time, operative work is instituted where caries appears, and the long course of dental treatment, on which the end results are so dependent, is started. In the placement of even the simplest occlusal filling, we have to consider not only the filling of the cavity, but also the maintenance of balanced occlusion and harmony of natural jaw relationships. This ideal holds good for all operative procedures from the simplest to the most complex type.

Next, we are confronted with loss of the teeth. When a unit of the natural dental mechanism is lost, as, for instance, is frequently the case with a lower first permanent molar, a disharmony exists which brings about retrogressive changes. Here again, in the field of crowns and bridgework, the ideal is not merely the replacement of the missing unit, but its replacement so as to maintain normal occlusion and natural denture space. This is true of simple or multiple unit replacement.

In regard to this work, it might be well to mention here that we can, of course, never completely replace natural units that were in normal function. The best that we may hope for is that replacements shall be so well within the limits of tissue tolerance that the minimum amount of tissue change will ensue.

Tissue tolerance is another factor which has heretofore been associated almost exclusively with denture work. The fact is that tissue tolerance enters into the situation from the placement of the simplest occlusal filling to the insertion of full dentures.

A simple operative restoration, if out of occlusal balance, will produce trauma. If this trauma is within the limit of tissue tolerance, the supporting structures compensate for the trauma by structural changes in the bone and soft tissues. If the tissue tolerance is exceeded, degenerative processes take place, resulting in the ultimate loss of the offending unit. If the replacement of this lost unit is also out of harmony with proper function and beyond tissue tolerance, it accelerates the degenerative changes, producing further loss and mutilation.

Restorations, either operative, crown and bridge, or prosthetic, which produce sufficient trauma to bring about marked structural change, are detrimental even though the supporting units are not lost; as, for instance, when lack of balance of a bridge or partial denture is compensated for by the reaction of the supporting tissues. Here, unfavorable ridge relationship and improper spatial conditions occur, with their attendant deleterious effects at the temporomandibular joint, and accompanying muscular changes. So, here too, we

must realize the great importance of the establishment of balanced occlusion in the maintenance of proper denture space.

With an increase in extent of the restoration and the number of units involved, there is accordingly a more marked effect on the occlusion and denture space from the replacement. The need for balance and harmony becomes increasingly evident, and it is at this juncture that the denture space is ordinarily accorded consideration.

It might be appropriate at this time to say a word in regard to the retention of natural teeth when they are out of occlusion and cannot be brought into normal function or when they tend to produce deformities of the ridges. Dental units of this type, even though they be of the natural dentition, should be eliminated surgically if they interfere with function of the dental mechanism as a whole. There is no reason to believe that the pathologic condition produced by a natural tooth is any more to be condoned than that produced by a dental restoration. There has been a tendency in this regard to be too lenient with natural units when they tend to produce or maintain pathologic conditions.

One of the commonest examples of this is the tendency to retain the upper or lower anterior teeth after the posterior teeth have been lost. It must be borne in mind that these statements are merely generalizations, and that while each particular case must be decided according to the circumstances, this particular practice has so often been the cause of producing unfavorable conditions in regard to tissue changes, jaw relationships and temporomandibular impairment that it is necessary to call attention to this particular type of case. As an example, in the typical lower lingual bar case, we have resorption rapidly taking place beneath the saddles with resultant lack of proper occlusion; and even when these bridges are kept in occlusion by repeated rebasing, the structural changes taking place in the mandible are such as to cause future complications regarding occlusion and denture space.

Let us then give thought to these facts and duly consider whether, in view of the changes to which I have referred, the proposed restoration is still indicated, remembering that, in removable work, especially dentures, the cooperation of the patient becomes an increasingly important factor.

One of the main problems in the full denture restoration is the separation of edentulous jaws in a manner which is not only physiologically tolerable, but also acceptable for function and esthetics. In the denture space, the position of the restoration is very important, bearing directly on balanced occlusion and articulation in obtaining favorable results.

The denture space, as we visualize it in relation to full denture construction, comprises that part of the oral cavity which is bounded by the lips anteriorly, the cheeks laterally, the tongue internally, the maxillary ridge and the palatal vault; the mandibular ridge below, the muscular attachments at the borders of the ridges and palate, and the continuation of the oral cavity posteriorly.

The fact that the denture space is modified by jaw relation and occlusion of the natural or artificial dentition and functioning muscle attachments forces us to seek a denture space which is individually normal and adapted to the best possible functional requirements in the particular case involved. We must appreciate, therefore, that the bite is

only one of four important factors and must be properly related with structure, function and esthetic values.

The bite not only has an important rôle in the initial work of denture construction, but also must be considered in the tissue changes that occur in the wearing of dentures. When tissue changes occur, such as resorption, there is a decrease of the opening component. The originally established centric jaw relation becomes changed, owing to the alteration of the denture space, cusp interference, loss of balance and tissue trauma resulting, with unfavorable conditions disrupting the denture mechanism as a whole. A result of this process is seen in the familiar flabby ridge where trauma has caused extensive bone resorption, and surgical work is sometimes necessitated in correction. If balance is maintained in keeping with tissue changes, flabbiness of ridges is avoided. This applies to partial as well as to full dentures.

The initial establishment of the bite and centric jaw relation depends, of course, on the case involved; on the condition of the underlying tissues, the manner in which the teeth have been lost, the musculature, temporomandibular conditions, esthetic values and other conditions which may have to do with the denture space. While we have no positive means to determine the exact opening which will secure the theoretical maximum efficiency for musculatory function, the range of the musculature is comparatively wide and there are general considerations which are of importance in this respect.

The patient seems to tolerate too great a degree of closure with prosthetic dentures much more readily than too great an opening, and, in this regard, we must beware of insufficient tongue space, the presence of bulging lips and sagging cheeks and speech impairment. In some cases, the desired opening cannot be established until a number of dentures have been made. This is what might be called corrective treatment, in which the desired opening component (bite) is gradually approached while we keep within tissue tolerance and maintain the patient's comfort.

The field of denture space is a promising one for further study. Rudolph Hanau was just embarking on research along these lines and had done considerable preparatory study in this direction. His unfinished work on tissue changes under full dentures promised valuable contributions to come. The fact that he realized the importance of spatial elements is evidenced by his treatment of what he called the plane of orientation, and its inclusion in the articulation quint. It seems that he was about to apply the fourth mathematical concept to dentistry; in other words, the element of time.

I have attempted to present a more comprehensive conception of the denture space, and to show its unity with balanced occlusion, articulation, and comfort.

At the end of the trail of preventive and restorative dentistry; after the gamut of treatment from all other branches of our art has been run, the patient comes to us reluctantly at last for full dentures; and here, where we have the least to work with, so much is expected, and we should give thought to the fact that dental treatment, of whatever nature it may be, should always tend to maintain a normal condition for the dental mechanism as a whole. The benefit of the particular type of dental service which we render should not cease with the loss, for instance, of a filling, a bridge or a partial

denture, but should be passed on through subsequent stages, so that when the necessity for full dentures arises, all previous dental treatment will have been conducive to the most favorable conditions for this final service.

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DISCUSSION

I. Lester Furnas, Cleveland, Ohio: "Quality is never an accident; it is always the result of high intention, sincere effort, intelligent direction and skilful execution. It represents the wise choice of many alternatives, a wealth of cumulative experience, and it also marks the quest of an ideal, after necessity has been satisfied and usefulness achieved." I have quoted a portion of the first paragraph of Dr. Farmer's paper because it is one of the finest statements of fact that I have ever read. I wish that this statement could be placed on a suitable card and displayed on the wall of every dental office and laboratory in the country as an inspiration and guide to the members of our profession. It could not but have a good influence on all who read it. The constantly changing and ever varying denture space has offered one of the baffling problems of denture technic throughout the years. It is practically the only dimension in denture construction that has no definite scientific basis for its establishment, being usually arrived at by guessing based on experience. "Denture space" does not seem to me to be the best term to use. "Vertical dimension" seems more in keeping with the other terms employed and more definitely suggests our problem. It is true that the vertical dimension may be considered by some as only one feature of the denture space, but the fact remains that in constructing the dentures, the dentist is chiefly interested in this opening component or vertical dimension, and he chooses to solve the other problems as they arise. The term, "vertical dimension" might be defined as the vertical distance at the median line between the crest of the mandibular and maxillary ridges of the edentulous mouth. Of course this definition would not be suitable were a full complement of teeth present, but I am assuming that there is no especial interest here in the correct vertical dimension in such cases. There is but one method for establishing this correct measurement that is known to me or that even approaches scientific accuracy, and it has many questionable aspects and is often impossible to use; that is, the method of making preextraction records. This method is questionable many times because of the fact that it is sometimes difficult to determine whether it is advisable to reestablish preextraction conditions and, in many instances, such a measure would be very definitely contraindicated. It is often impossible to use this method regardless of how desirable it might be, because of the inaccessibility of the patient. The various methods of making these preextraction records should have no place in this discussion and will therefore receive no consideration, but those interested will find the dental literature full of papers covering every detail of the subject. Another method advocated and used by a group of dentists calls for the construction of occlusion rims to a certain definite height. Different men use different measurements varying all the way from 18 to 24 mm., depending on the ideas of the individual. Just how or why any particular measurement is chosen seems to be a mystery, but when once it is selected, it is used in every case regardless of shape or size. This method is obviously very unscientific regardless of how practical it might seem. As far as I am aware, only one man has worked out a definite and individual technic for the establishment of this vertical dimension in each individual case. The method, that of A. K. Parks of Montgomery, Ala., may be described as follows: When the patient has a full complement of natural teeth and these teeth are in centric occlusion, this affords the correct vertical dimension for the patient at his present age. When he becomes edentulous, the stopping place in the closing movement becomes highly problematical. In the former case, the opening and closing movement is centered below and posteriorly from the condyle heads. In the edentulous case, the center of the movement is the same until the condyle heads meet resistance in their backward trend, at which elevation the axis is changed to the condyle heads. If we can know, then, when this change of rotation control takes place, we shall know the correct stopping point or correct vertical dimension of that patient. For determining this correct point, Dr. Parks' method is as follows: "Fashion from 10 gage stiff round wire an appliance similar to the bandage grip of an old-fashioned interdental mandibular splint and solder a horizontal pencil holder to the anterior extension. With hard wax, attach this to a

stiff, accurately fitted lower baseplate. Place this in the mouth and secure in position with a rubber band passed under the lower jaw. Place the record card to the side of the face, at right angles to the pencil and in contact with the point. Trace an outline of the upper border of the card on the face to facilitate replacement. Have the patient retrude and move from the extreme open to extreme closed position and vice versa. The pencil will record on the card arcs from two centers. At the point of intersection of these two arcs will be the correct point of closure for this individual case and if the point of the pencil is held at this point and the distance between the crest of the upper and lower ridges measured at the median line, that measurement will be the correct vertical dimension for the case. The point of division of this distance between the upper and lower occlusion rims depends upon the esthetics of the case."

In my hands, this technic has not been so successful as I had hoped it might be, but I believe that when an accurate method is worked out, it will be based upon a technic similar to that of Dr. Parks, and I recommend it to you for further research and investigation. I believe with Dr. Farmer in the importance of the vertical dimension in denture construction, and I know of no better method than the one which employs equal proportions of practical experience and esthetic considerations.

Dr. Farmer: Dr. Furnas stated that it is his practice to establish the desired opening with one set of dentures regardless of the amount of closure which has been present in previous dentures. There are many factors which should be considered: (1) the degree of opening, which is necessary to establish proper facial contour and function; (2) the age and temperamental make-up of the patient; (3) whether the previous dentures have been worn long enough for the muscle balance to be quite permanently established, and (4) the shape and density of the ridges. If these factors are favorable, the desired condition might be established at one stroke, but, with unfavorable conditions, it is always the safer procedure to bring about the desired change by a series of dentures and we are sure not to exceed tissue tolerance. If any tissue is subjected to a greater strain than it can safely tolerate, destructive changes are sure to follow. The majority of cases can be handled with one set of dentures since the opening is usually not great. There are two basic conditions which we must always bear in mind no matter what branch of dentistry we are considering: balanced articulation and tissue tolerance. Articulation is basic so far as growth and development of the ridges and face is concerned. It is basic in operative and prosthetic dentistry. In orthodontic and pyorrhea treatment, occlusion is basic, and success or failure depends on the stresses placed upon the supporting structures. The more nearly the occlusion approaches the ideal, the more nearly will there be the muscle balance and proper facial contour. Finally, the more nearly perfect the balance of occlusion in the natural teeth, the more nearly ideal will the ridge relation be for the support of artificial dentures when the permanent teeth are lost.

SYSTEMIC CONDITIONS ASSOCIATED WITH ORAL FOCAL INFECTIONS*

By NELSON G. RUSSELL, M.D., Buffalo, N.Y.

A CONSIDERATION of the subject of systemic disease associated with oral infection leads one to the conclusion that the dentist and physician are becoming more and more interdependent. It seems somewhat paradoxical but is true that the more each learns of the science of the other, the more dependent he becomes on the other.

A few years ago, the University of Buffalo School of Medicine started a course in appreciation of dentistry that has progressed until the first two years of the courses are almost identical. Instead of the professions' becoming more independent of each other, appreciation each of the other is making cooperation essential.

From the time Benjamin Rush noted that arthritis improved after the removal of infected teeth, the relation of tooth infection to general disease has been of increasing interest. In recent years, Drs. Billings and Rosenow fostered the study of the interrelation of focal infection and general disease probably more than any others. While some of their conclusions are now open to question, the fact remains that a great advance has been made as a result of their pioneer work.

I am not in a position to analyze critically the laboratory evidence for or against the various theories as to the mode of dissemination of bacteria, elective or selective, but I shall attempt to discuss the clinical evidence of the relationship between infective foci and general conditions.

Ocular conditions are seemingly most definitely related to oral foci. Such conditions as uveitis, iritis conjunctivitis or ulcers are so frequently relieved after removal of infected teeth that there seems to be little doubt as to the relationship. One author reports 80 per cent of recoveries after removing infected teeth or other foci. The fact that these conditions yield to nonspecific protein injections in a high percentage of cases arouses a little doubt in the minds of some as to cause and effect.

The clinician, in the light of present information, cannot but consult the dentist in conditions of this nature and afford the patient the benefit which seems to arise from elimination of possible foci of infection. The relation of sinus infection to teeth or mouth is not so definite, as relatively fewer streptococci are found in the sinuses and a preponderance of streptococci in teeth and tonsils. Meader's figures on this show considerable variation. Respiratory infection occurring in people with oral infections is probably more common than may be assumed from positive evidence. There seem to be undoubted cases of relief of asthma by use of vaccine prepared from a culture from

*Read before Section on Oral Surgery, Exodontia and Anesthesia, at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

extracted teeth, one quite striking case being reported by Palmer and Carr.[1] The more frequent finding of spiral organisms and fusiform bacilli in lung cavities points to the oral cavity as a possible primary source of the secondary invaders in the lung.

Rheumatic fever and cardiac disease may be considered under the same heading, as most of the valvular cardiac diseases come before early adult life. In many articles, rheumatism is placed high on the list of diseases caused by focal infection, particularly infection in the tonsils. The dental articles that I have looked over give this disease as possibly secondary to dental infection. It has a fairly definite geographic distribution with racial influences not affecting dental infection. Even the direct evidence that tonsillitis (acute infection) ushers in most attacks of rheumatic fever cannot be taken as proof that the general infection is secondary to a local tonsillar infection. The observation of many cases of tonsillectomy, with adequate control, has apparently proved that rheumatic fever recurs with the same frequency whether tonsils are removed or not.

From the clinician's point of view, this subject is of great importance, because of the frequency of fatal subacute bacterial endocarditis, fulminating after extraction of teeth. Bernstein,[2] cites the case of a student, aged 25, with a history of rheumatism, who came under his observation after having two teeth extracted. On the fifth day, he developed fever, which persisted. Five months later, the patient died of subacute bacterial endocarditis. Bernstein raises the question as to whether the infection was disseminated by the extraction. This case is similar to several that have occurred in my experience, and they are all too common. A puzzling point about the disease is the fact that the symptoms may become quiescent during treatment although the disease is still active; hence, the necessity for choosing a time when the patient has been free from symptoms and without treatment for some time. The occurrence of an acute general condition in such a case may be used as an argument for the teeth being the primary focus and equally well that they are secondary. It seems to make little difference as regards procedure in a given case. There is a time when extraction is dangerous, and apparently a safer time, but we have no definite criteria for determining which is which, beyond judgment based on clinical observation.

Arthritic conditions seem to be more directly associated with tooth infection than are any other diseases. Some writers report a large percentage of recoveries following removal of focal infection. Cecil and Archer, in one report, gave 84 per cent of cases cured or definitely improved. Unfortunately, although we have a definite classification such as atrophic or hypertrophic arthritis, with a clear indication, from our point of view, for treatment in the way of removing foci of infection, these conditions merge into one another so that the indications are not so clear. One of the most remarkable cures that I have heard reported recently was that of a woman, aged about 70, with marked arthritis, which had crippled her very much. Her teeth were examined by one of our dental experts, who found no evidence warranting interference. The condition was perfectly relieved in less than a week after extraction of several teeth, which were not even suspicious on roentgen-ray examination, even after rechecking. The

1. Palmer, B. B., and Carr, M. W.: J. D. Res., 11:847 (Dec.) 1931.

2. Bernstein, M.: Ann. Int. Med., 5:1138 (March) 1932.

findings of Austin and Cook are significant: 4 per cent of normal teeth taken with the strictest precaution showed streptococci and about an equal number of positive *Streptococcus viridans* cultures were obtained from roentgen ray positive and roentgen ray negative teeth, which were pulpless. The figures were 89 per cent of positive and 84 per cent of negative teeth. Almost inseparably connected with arthritis are numerous vague conditions grouped under the names neuritis, myositis, etc, and these are often definitely cleared up by the removal of infected teeth. The relief afforded by drainage of teeth in cases of myositis, with the return of symptoms with obstruction of drainage, has been conclusively shown. As to the character of the reaction, Meader suggests that direct toxic effects on the allergic joints, with atrophic change due to toxic effects on the local blood and nerve supply, play a determining part in most cases.

As far as the genito-urinary tract is concerned, Bumpus reports quite conclusive evidence of recovery from bladder infection following elimination of tooth infection. Strangely enough, positive cultures from the local lesion in some instances yielded colon bacilli, while the tooth showed streptococci. Cases of nephritis, it seems to me, can be put in two groups: those caused by a streptococcus and others. While conclusive evidence of dental focal infection causing nephritis may be lacking, any probable source of infection may as well be eliminated, but at a time when there is least danger of precipitating an acute exacerbation.

The rôle of fusospirochetal infection of the mouth seems to be worthy of special consideration because of the frequency of the association of the dentist and physician in the care of such cases. A clinical description of this infection (fusospirochetosis) is given by Richard and Marguerite Dean[3] as follows:

> The manifestation of the condition may be local or general, acute, subacute or chronic. In the acute type known as ulcerative stomatitis or trench mouth, the gums are swollen, edematous and inflamed. There occurs over the gum tissues and about the necks of the teeth a thin pseudo membrane, varying in color from an ashen grey to a yellowish white and usually blood tinged; small yellowish white areas are frequently seen beneath the skin. This membrane is easily removed revealing a very red and angry looking gum tissue, which condition is due to the development of inflammation or pigment derived from hemoglobin and gangrene. The gum tissue is succulent due to a great increase of interstitial fluid and contains large numbers of organisms in tissue spaces, lymph channels and in and around capillary loops. Large ulcers and gangrene may occur. The general symptoms vary much in type. There is frequently malaise, weakness, intestinal upsets, headache and nervous manifestations. There is usually some decrease in granulocytes. Accompanying this leucopenia there may exist anisocytosis, poikilocytosis and polychromatophilia—an associated blood dyscrasia which may be due to fusospirochetal blood stream infection.

Thompson[4] reports a case of fusospirochetal brain abscess occurring after extraction of teeth. Attention is called to this condition because of the frequency of complications following active treatment of dental conditions in this class of case. Whether the Vincent's organisms have anything to do with blood conditions, such as leukemia, acute or chronic, or agranulocytic reactions, does not concern us so much as the fact that these two conditions coexist.

During the past year, I have had one agranulocytic reaction, one acute leukemia and two chronic myelogeneous leukemia cases under my care as a result of an exacerbation following tooth

3. Dean, R. D., and Dean, Marguerite T.: J. D. Res., 11:747 (Oct.) 1931.
4. Thompson, L. E.: J.A.M.A., 93:1063 (Oct. 5) 1929.

extraction. While the result would have been the same, there was considerable embarrassment owing to the fact that the general condition was overlooked.

I have tried to suggest some of the commoner general conditions associated with infection in the mouth. A discussion as to whether these are from foci of infection is not so important to the clinician as the fact that certain general conditions are relieved by elimination of dental infection.

A study of focal infections, the newer concepts, by Pollia[5] gives an excellent summary of what is known on the subject, and one should hesitate to be dogmatic after reading this article. I should like to make a plea for even greater cooperation between dentists and physicians in the study of disease conditions, perhaps a little less deference being shown the physician in the study of dental conditions. By this, I mean, the dentist should interpret his roentgenograms instead of sending films to a physician like myself who is not able to read them. Secondly, it seems clear to me that there are definite dangers in operating in certain cases before the general condition has become quiescent, or in other general conditions, as the anemias, when any kind of shock will possibly precipitate a fatal issue.

Acute rheumatic fever deserves special comment. As I have stated, there is no conclusive evidence that it is secondary to any focus and the serious condition, subacute bacterial endocarditis, is so often precipitated by tooth extraction that I suggest the greatest caution in operating in these cases unless they are quiescent. Even mild fusospirochetal infection in the mouth may be a serious menace if the organisms are introduced into the circulation, hence, the necessity of not only checking the bacterial flora but also studying the blood before any operative procedure. An immense amount of work must be done by both groups before we can approach a solution of this problem.

5. Pollia, J. A.: J. D. Res., 11:83 (Feb.) 1931.

DISCUSSION

Harry M. McFarland, Kansas City, Mo.: Dr. Russell emphasizes the interdependence of physician and dentist, indicating there must be close cooperation between the professions in order that the highest service may be rendered. Oral surgeons are brought closer to the medical profession than are any other specialists in dentistry and, in consequence, it is highly important that they recognize their responsibilities. It was not until Dr. Billings and E. C. Rosenow advanced their theory of focal infection, in 1912, that the two professions entered seriously into the matter. Dr. Russell places apical infection first among the common oral infections to be considered. Recent comparison of cultures in many cases of pyorrhea alveolaris and the apices of devitalized teeth seems to place pyorrhea in the undisputed first place as regards frequency and virulency of bacteria. Disturbances of the eye of an inflammatory character are most reasonably explained on the basis of a direct invasion through the perivascular and the perineural lymphatic spaces, which drain their products directly into the orbital contents including the eyeball itself, it being unnecessary in this instance to hypothecate a preliminary blood stream infection. Doubtless, some such observation and experience in ages past was responsible for the name "eye teeth" as applied to the cuspid. A neuritis rather than blood-born septicemia dominates the picture in this connection. It is hardly necessary to comment on the efficiency of the nonprotein injections considered by many as a dependable corrective in these cases. It seems that if this were true, nonprotein therapy would not have so soon lost its popularity. For the last year, medical and dental literature has had but little to say about the therapeutic efficiency of nonspecific therapy, although previously many papers were written advocating such treatment. Cardiac disease should receive serious consideration in connection with oral infection. It is well known that all infected areas have a definite blood supply and that the heart must carry an extra load when such conditions

exist. Fatalities from cardiac involvement are on the increase. Oral focal infection should be eliminated in treating such diseases. In the discussion of heart disease of infectious character, it would seem unwise to ascribe to either dental or tonsillar infection even the chief rôle in rheumatic fever. Cardiac valves roughened by a generalized rheumatic fever form a most excellent nidus for blood-borne organisms that may be associated with any blood stream infection. Tonsillectomy and tooth extraction are accompanied by a particular hazard, when practiced on persons who have a history of rheumatic fever. In the past few years, there have been a number of deaths and severe illnesses in Kansas City which have been regarded by authorities as directly and immediately consequent on tooth extraction practiced without the proper cleansing, disinfection and preoperative preparation of the oral cavity and its contents (tongue, gums, teeth). Subacute bacterial endocarditis, probably more than any other cardiac disease, has been ascribed by the medical and dental professions to focal infection about the teeth and tonsils. It might be well to bear in mind that most cases of bacterial endocarditis have the background prepared by rheumatic fever, recognized or otherwise. This should warn us against dependence exclusively on oral surgical procedures to avoid such a cardiac catastrophe in the presence of cutaneous or mucous membrane infections far remote from the mouth, e. g., gonorrheal endocarditis and endocarditis secondary to cutaneous abscesses; which would indicate that endocardial infections arise from many sources of invasion of which the teeth are but one. The opportune time for tooth extraction in the face of rheumatic history is not a matter that can be determined by the most skilled physician or dentist. It is the dental oral surgeon's duty to make every effort to eradicate infection or render the field innoxious by the most rigid oral hygiene before any attempt at extraction of the teeth. There can be no doubt as to the increased hazard in removal of teeth for people who have had rheumatism. The rôle played in the production of genito-urinary infections by diseases of the teeth appears more or less questionable in the light of the fact that these organs are in close proximity to the rectum and to the uterus and adnexa, which provide much more likely portals of entry to the genito-urinary system than the teeth provide. Fusospirochetal infections of the mouth are of chief importance because the ulcerative process breaks down the epithelial barriers of the mouth, creating an ideal portal entry for the blood-loving streptococci. As far as I know, no case of generalized blood stream infection has been recorded as due to Vincent's infection. Occasional brain abscess and lateral sinus thrombosis in which the organisms are found after extraction of teeth appear more likely to be carried there in rather gross emboli.

GOLD FOIL STUDY CLUBS*

By JAMES MARK PRIME, D.D.Sc., F.A.C.D., Omaha, Nebr.

WHEN Hunter made his memorable condemnation of "American septic dentistry," a new era of study and progress was inaugurated, affecting all lines of dental education. Dental literature was improved and it has been more generally read. Dental conventions become more frequent and of a better character.

These activities resulted in much good, but the most effective method of teaching was yet to come. It is known as the study club. It gets away from the printed page. It is also a great improvement over the lecture, which has

*Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

the fault of being, often times, more entertaining than instructive.

Dental procedures are closely associated, in a large part, with technical mechanics. These are difficult of explanation in illustrations and they can be taught in only a limited way by lecture. The study club plan is the most effective and it is gaining popularity wherever tried. Prosthetic, inlay, periodontia, orthodontia, in fact clubs along all lines have been formed, and many have continued their activities for years.

There is no subject which fits so uniquely into the work of a study group as that of gold foil. In fact, this subject cannot be successfully taught in any other manner. Experience has demonstrated that it is the one endeavor which holds groups together over long periods of time. More than any other technical procedure in dentistry, the use of gold foil must be learned by doing, not by reading or by seeing.

It seems to be the subject, more than any other, in which long years of experience is required to develop a special coordination of eye, hand and judgment. Operators say that this is easy and it seems easy when we see the skilful operator at work. It may look easy to see and hear a master play his violin, a finished penman write or Bobby Jones play golf, but *is* it easy?

The use of gold foil may be compared to playing golf, for as in golf, and as before stated, it cannot be learned by seeing another use it. Neither can it be acquired from illustrations. It must be felt: it must be experienced. It is a constant growth. It possesses, in large degree, that common characteristic of human development wherewith we constantly climb, yet never arrive. To think of ourselves as finished operators is fatal. It is just as surely fatal if we attempt a standardization of our technic and close our minds to suggestions from others.

That gold foil technic has not kept pace with other dental procedures is often affirmed. A dentist who accepts this statement as fact has not taken the trouble to keep himself informed.

Most spectacular of all operative technics has no doubt been that associated with the cast gold inlay. Yet the improvement in this technic, since the day it was first given to us, is no greater than that associated with the use of gold foil over the same period of time. This statement will be accepted only by those who are wholly familiar with the improvements made in both the inlay and foil.

The use of the inlay would appear to have made a greater advance because of its more recent advent and its more nearly universal use. In localities where gold foil has been studied and used alongside the inlay, a comparable advancement will be apparent.

On the introduction of the inlay, human nature, true to form, accepted it wholeheartedly, and, for a time, the gold foil filling was almost forgotten. Consideration and experience are beginning to assert themselves, until a definite revival of gold foil is seen. Experience has demonstrated that, for certain cavities, there is no substitute for foil.

The Bureau of Standards aided materially in perfecting the inlay; but after all the good work done, we find ourselves still in a dilemma, for an inlay, however good, is no better than the cement with which it is set. Equal in importance to if not of greater import than the fit of the inlay is the condition of the cement. Most of us would

prefer to set a poor fitting inlay with a thoroughly dependable cement, if there were such a thing, rather than set a perfectly fitting inlay with a poor cement.

Since the integrity of the inlay hinges so surely on the cement, is it not of greater importance that the Bureau undertake the task of perfecting it? Who can mix two batches of cement exactly alike? With our present knowledge of the materials and their management, we are compelled to say that it is well nigh impossible. This all becomes apparent when crowns and inlays are removed. Under some, the cement is excellent; while under others, and perhaps a majority, it is of very poor quality. It is not uncommon to find it almost completely dissipated or, near a margin, it may be black and have a bad odor.

In my visits to different parts of the country, I find work in operative dentistry much neglected. The greater progress is confined to the inlay. This is to be regretted, when we realize that more than 95 per cent of dentists are general practitioners in whose practices operative dentistry has no small part. I find gold foil technic the most neglected subject.

The crying need in dentistry today is for more and better operators, and the greatest single need is improvement in gold foil technic. We are losing our best operators, many times by their going into a specialty. Not satisfied with the small fees that they are able to get for their operative work, they enter the more lucrative specialties. While this operates, in most cases, toward better service, it also increases the cost of dental care to the public; which, in turn, often creates a justifiable prejudice against the profession.

Since operative dentistry represents the majority of work in about 95 per cent of dental offices, it would seem that operators would endeavor to improve themselves more along this line than along any other. The condition is just the reverse: we find more poor work in operative dentistry than in any other branch.

Can it be because the work cannot be sent to the laboratory? Or is it because there are so many competitors who work for small fees that each man believes that he must follow the same course and do his work hurriedly and for small fees, which results almost invariably in poor work?

A gold foil study group has a wholesome influence on operators who find themselves slipping into these bad habits. Unlike the inlay, the gold foil filling has no part which may be sent to the laboratory. Therefore, it develops a high degree of self-reliance, along with its many other advantages.

Now, above all other times since I have been practicing dentistry is the ideal time to organize these study groups. There are many idle hours which may be turned to advantage in this study work. These are times to prepare ourselves for the busy days which are sure to return.

Prosperity will return. Shall we be ready for it?

Few realize the advantage gold foil offers to the dentist's bank account. A leader in dental economic thought recently stated to me that "dentists should take up gold foil work if for no other reason than the advantage it offers from an economic standpoint."

We know of operators, who, after working in a study group for a few years, doubled their income on operative work. Why this should be becomes ap-

parent soon after they start the work in the study group: this is, in fact, an important part of the group training. It is not enough to study cavity preparation and carrying out and finishing the operation.

We study mouth conditions to determine what filling materials may be indicated in a certain mouth. Then we concentrate attention on a certain tooth on which we wish to operate, and when the cavity preparation has progressed sufficiently, the decision regarding a filling material is made. The economic angle can, at this stage in the procedure, be quite definitely considered and presented to the patient. This done, we are ready to proceed.

How often do we plan a gold foil operation, and when we are well along with the cavity preparation, the plan to employ foil must be abandoned, and an inlay placed instead, and not infrequently, even the inlay cannot be used and amalgam must be used.

It soon becomes apparent to the thoughtful operator how valuable this training is. Different angles are carefully considered and, with open minds, we weigh them all. It is many times surprising how the picture will change when facts are brought to bear on the case at point, and even the demonstrator will agree and the operation proceed on a suggestion offered by one of the group.

A successful demonstrator is firm but never dogmatic. He stands on proven facts, but with his mind open always to suggestions. Groups are cautioned against selecting a "Bourbon" for their demonstrator. You are familiar with the Bourbon; he forgets nothing and learns nothing.

There is no other single factor so important in forming a study group as the choice of the leader. The fact that there is no available leader prevents the organizing of groups in many localities, although the need of such training is evident.

The mistake is sometimes made of choosing an old practitioner who does much foil work in his practice. This fact does not necessarily qualify him as a leader. Although able to carry out very good foil operations, he may be totally lacking in the ability to teach. His personality, or temperament, may be wholly unfitted to the task. He may have some "trick" technic which, although *he* is able to handle it successfully, he is unable to teach so others can do it. He may have an antiquated technic, considered good twenty-five years ago, but no longer adapted to the requirements of modern operative dentistry.

The average gold foil operator of twenty-five or thirty years' experience is often lacking in improved ideas of cavity preparation. Even though the decay is only beginning, he cuts the tissues unmercifully, believing such cutting meets the requirements of the material. This at once sets up a prejudice in the minds of those who observe, and justly. I would not use foil if its use required such radical cutting. An operator who does this overlooks the fact that no longer is a tooth forced to meet the requirements of the material, but materials are forced to meet the requirements of the tooth.

The fact that teeth are cut so uselessly and ruthlessly by these older operators creates, perhaps more than any other thing, the prejudice against foil.

An article appearing in a current dental journal in which the author makes some references to foil reflects the prevalent idea on this subject: "There is no doubt that under favorable

circumstances gold foil is the ideal filling material." The author then goes on to mention certain conditions, all of which are very good: Later, he says: "Dr. Gold Foil crank! How many dentists do you number among your patients who insist upon, or even submit to, large gold foil operations today?"

His question cannot be answered unless he is more definite as to what he means by "large gold foil operations." If he means an operation that would require two hours or more, by a skilled operator, our reply to him would be that we have not been doing these operations for years, not since the advent of the inlay.

This author goes on: "The man in general practice, with sympathy for his patients and a sense of humor toward his critics, cannot help being amused when a gold foil enthusiast shouts for large two surface foil restorations."

A "two surface cavity," as he calls it, need not call for extensive operation, and our reply to him is that we number many dentists and physicians among our patients who do not only "submit" but insist on having foil in many "two surface" cavities.

We see little ground for "amusement" in this, but if there is any, it may be found in the complete lack of understanding on the part of this would-be critic.

I have no doubt that it would be a real punishment to have him place a "two surface" foil filling. We have heard many such remarks before, and no answer should be made were it not for the fact that such remarks have a tendency to increase prejudice in the minds of those uninformed. He does not know that, in cases better and more quickly performed, many "two surface" operations are possible with foil and with no more discomfort than that occasioned by making and setting an inlay. Diversion is found in going to the offices of men who talk thus, to look over their gold foil equipment. We then understand: the majority of these men could not carry out a creditable gold foil operation. A few obsolete instruments and an automatic mallet make up the outfit. To be sure, these men could not be very strong advocates of foil, and it can be understood why their patients would not be enthusiastic about it. Furthermore, why no dentists would be numbered among their patients can be understood.

Some of the subjects which gold foil study groups take up are:

Operating positions to gain efficiency and conserve health:

Comfort of the patient.

Magnifying glasses to aid vision.

Application of the rubber dam.

Separation where needed.

Contact forming and finishing.

Cavity preparation; adapting well-known principles to constantly varying conditions.

Greatest immunity with minimum of cutting; so forming walls to secure maximum retention with minimum cutting; keeping pulp preservation above all other considerations.

Lines of force and stepping of condensers to secure positive adaptation to walls without undue stresses, which would invite fracture and cause pulp irritation or checking of enamel:

Cooperation between operator and assistant:

Use of malleting by assistant, getting away from the objectionable automatic mallet.

New instruments for more efficient condensation, with less stress on the periodontium.

Improved instruments for finishing.

New cutting instruments.

Preparation of the foil.

Use of separators:

Application of clamps, and many other aids to operative procedures.

The first club devoting itself exclusively to gold foil, as far as I am able to ascertain, was organized, May

20, 1898, at St. Paul, Minn. Its directing spirit was the late E. K. Wedelstaedt, of St. Paul. He had been closely associated with G. V. Black, from whom he received his inspiration, and for whom the club was named. With a limit of twenty-five active members, they have met six to nine times a year for the past thirty-four years. Their teaching resulted in starting other similiar study groups.

C. E. Woodbury of Council Bluffs, Iowa, as early as 1906, led in the organization of the Woodbury Study Club, which continues its meetings at Omaha to the present time. Many men, including myself, have received most valuable instruction through this club.

Colleges in other states have called two of its members for full time instructors.

About the time the Woodbury Study Club was organized, a group of men in northern Iowa began work along the same line, and received their first instruction under Dr. Wedelstaedt. From this group sprang some of the great men of dentistry.

Just twenty years ago, Drs. Wedelstaedt and Searle made a memorable trip to the Pacific Coast, conducting classes in Seattle, Tacoma, Portland, San Francisco and Los Angeles. These pioneers sowed seed that fell on both stony ground and fertile ground. Some of the seed grew and some of it withered.

Enthusiasm prevailed for a number of years, but gradually cooled, for want of leaders. A leader did come in W. I. Ferrier, of Seattle, the lone survivor, who has carried on through all the years. Today, he heads the most active movement in gold foil technic in the country, for it is in the Pacific northwest that we find more gold foil study groups than in any other part of America.

As a direct result of his efforts, the most comprehensive dental clinic ever conducted was staged at the Pacific Dental Congress in 1932. Here, in one great area, thirty-six operators, each equipped much as if he were in his own office, prepared cavities and completed their operations, at one and the same time.

Think of it: thirty-six skilled operators all working at the same time, and carrying out thirty-six operations, by the best method ever developed by human hands.

Hundreds have had and are still getting direct training from these clubs. Thousands have had indirect training. Not only have these men been trained in gold foil work, but their dental work in other lines has been elevated to a higher plane.

Too much credit cannot be given to those pioneers, Wedelstaedt and Searle who, getting their inspiration from the immortal Black, went forth, with the result that dentistry received a great impetus in the middle and western parts of the United States.

Most of the schools are making gold foil work a requisite for graduation. My criticism lies in the fact that most, if not all, schools try to teach the student too much.

I am the instructor in a gold foil study group of twelve men in Omaha. We are in the third year and we do not yet consider the men ready to make classes 2 and 4 (commonly called two surface) fillings. If men out of school and in active practice for from ten to fifteen years are not capable of attempting these complicated operations, how may we expect the student, with no practical experience, to be able to manage them during his short, crowded school term?

Obviously, the request that he carry

out operations which require two to three hours has the effect of discouraging the student; which explains why so many men never attempt this work after graduation.

This should not be so. The situation can be corrected if we go at it in the right way.

The deans of the schools must first interest themselves sufficiently to look into the matter. Too often, they get a man whom they consider the best available, but who is practicing the methods of twenty-five years ago. He may have some individual, impractical ideas ill-adapted to the needs of the student.

The deans should make an unbiased, careful investigation of modern gold foil technic, to determine what is best adapted to the requirements of the school, and get a capable young man of the locality to take a course in this method, under competent instruction and, when his instructors consider him capable of teaching the subject, give him a written statement to the effect that he is so qualified, avoiding any semblance of a diploma, and which he might hang up in his office.

The student should be required to start on buccal pits and handle many of them before he is permitted to work on pits and fissures in the occlusal surfaces, which are next in order in ease of management. After he has had many of these cases and proved his ability to handle them successfully, he should pass to the simple and accessible Class 5 cavities, the labial and buccal gingival cavities. In the last months of his course, he might be permitted to undertake a few cases of classes 3, 2 and 4. Not many of these should be required of him. The cases should be selected by the demonstrator and they should be as easy as possible.

A horse will balk when he is asked to pull a load too heavy for him. So it is with the student: give him a load too heavy and he will "balk," and not attempt the work involved after he graduates, at which time he begins work on his own initiative.

If the student is given only such tasks as he can master, he will enjoy doing them, and much better results will follow. He must understand that a finished gold foil operator cannot be made during the short school term, and he must be instructed in plans to perfect his technic, through gold foil study groups, after his graduation.

The foundation for a study group may be found in every locality. The prospective members need not be all users of foil. In fact, as a rule, these are just the men to avoid. The best timber for the making of a successful foil operator is the one who possesses ambition, industry and a reasonable degree of manual dexterity. Above all, he must be teachable. Such men are found when we look for them. Leadership will begin to manifest itself in one or more men, and if the hunger for knowledge is keen enough, small obstacles will be swept aside and, with determination, they assume a united front marching on to great accomplishment.

Until this leadership is proven, it is imperative that competent leadership be obtained elsewhere.

In all the lines of dental progress, there is not one that will return results equal to the gold foil study club—equal in that incomparable pleasure of a thing well done. For the small investment in equipment, there is nothing even approaching it in monetary return. Then, the best of all returns lies in the con-

sciousness that we are giving the patient the best that has been produced in dentistry in 100 years of progress.

Indications point definitely to a return of gold foil; which only demonstrates again, that "truth crushed to earth shall rise again."

The call comes loud and clear. Opportunity knocks at our door. What will our answer be?

VALUE OF ETHYL CHLORIDE IN EXTRACTIONS FOR CHILDREN*

By MAX H. JACOBS, M.D., D.M.D., Boston, Mass.

SINCE Heyfelder first used ethyl chloride as a general anesthetic, in 1848, there have arisen, from time to time, spirited controversies as to its safety and value.

In 1880, the British Medical Association decided that ethyl chloride was an anesthetic too dangerous to human life, and emphatically advised against its use. It remained unused until 1895, when Carlson and Thiesing[1] reintroduced it. From 1895 to 1916, ethyl chloride was used and discarded several times. In 1916, Gobie introduced it at the Forsyth Dental Infirmary for children, where it was given for short anesthesia, by inhalation, for the extraction of temporary teeth and other minor surgical work in the mouth. Reports of the successful administration of ethyl chloride at the Forsyth Dental Infirmary led to its much wider use in the United States and England. From then on, the literature was replete with reports concerning successful administration, fatalities and the different technics for the induction of ethyl chloride.

*Read before the Section on Mouth Hygiene and Preventive Dentistry at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 14, 1932.

1. McCardie: Lancet, April 4, 1903.

REVIEW OF THE LITERATURE

A review of the literature is quite interesting, when the number of fatalities due to ethyl chloride administration is compared to the number due to chloroform, ether and nitrous oxide anesthesia.

In 1902, Lotheisser reported 2,500 cases of ethyl chloride anesthesia with one death. The same year, Ware reported 12,436 cases with one death.[2] Seitz, of Konstasz, reported 16,000 cases with one death.[3] Da Costa has knowledge of three unpublished deaths due to ethyl chloride anesthesia.[4] G. W. Bampfield Daniell, in 1919, reported 15,000 cases with no fatalities.[5] He also reports that T. D. Luke collected evidence of twenty-two fatalities, details of only seventeen of these being available.[6] In 1923, Samuel F. Rose reported 15,000 cases with no fatalities.[7] John C. Buchanan,

2. Ware: J.A.M.A., Nov. 8, 1902.

3. Da Costa, J. C.: Modern Surgery, General and Operative, Philadelphia: W. B. Saunders Company, 1931, p. 1352.

4. Footnote 3, p. 1351.

5. Daniell, G. W. B.: J. Orthodontia, and Oral Surg., 5:528-536 (Sept.) 1919.

6. Luke, T. D.: Lancet, May 5, 1906.

7. Rose, S. F.: D. Surgeon, 20:437-439 (July) 1923.

reporting statistics from the German Central Society of Dentists, found no deaths in 70,630 cases.[8] Mavrocordato, in 1930, reported 3,000 cases with no death.[9] Miller reported five deaths in 43,796 cases.[10] In 1930, I reported 123,210 cases of ethyl chloride anesthesia in children with no untoward effects other than occasional nausea and vomiting.[11] From January, 1930, to May, 1932, inclusive, we have administered ethyl chloride in 26,388 cases, with no deaths. This makes a total of 149,598 cases of ethyl chlorid anesthesia, without a single fatality, administered at the Forsyth Dental Infirmary, in a period of sixteen years.

An analysis of the foregoing recorded cases establishes a few interesting facts. We find 327,960 reported cases with thirty-three deaths. Here, we have one death in every 9,907 cases; a too high mortality.

Can we depend on these statistics? In the fatal cases, was death due to administration of ethyl chloride or to some other cause? Was the ethyl chloride pure or contaminated? How many of these cases were adult? How many were in children? Were the patients in condition to receive a general anesthetic? How many died from coronary disease? Would death have occurred if some other anesthetic had been used? Was the ethyl chloride administered by a skilled anesthetist? These questions must be answered before discarding what may be a valuable anesthetic agent.

I have been directly or indirectly interested in 45 per cent of the 327,960 ethyl chloride administrations referred to above. In all of these cases in which I have been interested, the anesthetic was administered to children ranging from 4 to 12 years of age. The ethyl chloride was given to unprepared children without premedication, sent to the infirmary from the streets and the schools. Not one of them was physically examined for heart disease or any other condition. The greater number of the administrations were made by internes, unskilled in anesthesia, but under competent supervision. Yet no fatality occurred in these cases.

ESSENTIALS FOR AN ANESTHETIC OF VALUE

There are certain essentials for an anesthetic of value: 1. It must not permanently alter any function of the body. 2. It must not permanently injure any of the tissues of the body. 3. It must affect respiration and circulation so gradually that oncoming danger symptoms can be noted and checked. 4. Overdose of the anesthetic must paralyze respiration before circulation, that artificial respiration may be effective. 5. Loss of consciousness and insensibility to pain must be caused by temporary action on the nervous system, and not by asphyxiation.

Because in properties and physiologic action, ethyl chloride adheres to the foregoing rules, it may be considered a valuable anesthetic.

Examination of patients to whom ethyl chloride has been administered reveals no permanent dysfunction. We have found no tissues injured. The margin of safety in ethyl chloride anesthesia is between that of nitrous oxid and that of ether. The stages of nitrous oxid anesthesia in children are so fleeting that jactitation may occur suddenly and without warning. The stages of ethyl chloride anesthesia, although rapid in succession,

8. Buchanan, J. C.: D. Digest, 36:243 (April) 1930.

9. Mavrocordato, T. J.: D. Items Int., 52:365 (May) 1930.

10. Hare, H. A.: Practical Therapeutics, pp. 277-278.

11. Jacobs, M. H.: D. Cosmos, 72:926 (Sept.) 1930.

permit recognition of untoward signs before danger symptoms occur.

Hare[10] has found that ethyl chloride is one-nineteenth as powerful a depressant to heart muscle as is chloroform. With ethyl chloride as with chloroform, the blood pressure is lowered, and its use may cause cerebral anemia, if it is not administered properly; but the respiratory center is paralyzed before the circulatory center.

Ethyl chloride does not produce loss of consciousness and insensibility to pain by asphyxiation. It acts on the brain and nervous system, the effect being temporary. Thus, ethyl chloride conforms to the rules of a safe and valuable agent.

MORTALITY RATES COMPARED WITH THOSE OF OTHER ANESTHETICS

Hare[10] quotes Gurlt as stating that he found the death rate in chloroform 1:2,039. Julliard and Ormsby, in 676,767 chloroform administrations, report 214 deaths—1:3,162. The same authors report that, in 407,553 ether administrations, there were twenty-five deaths, or 1:16,302. Hare places the death rate in ether anesthesia at 1:20,000.

Gwathmey[12] places the death rate in nitrous oxide anesthesia at 1:10,000. From the cases that I have collected and enumerated, the death rate in ethyl chloride anesthesia is 1 in 9,907 cases.

In determining the value of ethyl chloride anesthesia in children, we must deal with an entirely different set of statistics. The 149,598 administrations that have been made at the Forsyth Infirmary have been primary anesthesias; that is, sufficient anesthesia to produce loss of consciousness with insensibility to pain, by the use of the least amount of ethyl chloride plus the greatest amount of air intake. It is to be noted that the mortality is zero.

12. Gwathmey, J. T.: Anesthesia, New York: D. Appleton and Company, 1914.

IMPORTANT CONSIDERATIONS IN THE USE OF ETHYL CHLORIDE

There are certain fundamental considerations involved in the administration of any anesthetic. The importance of these considerations is intensified when we deal with children. The nervous system of the child is unstable. Predisposition to shock is in direct proportion to the development of the nervous system.

The psychic factor must be considered. All children who are aware that they are about to be given a general anesthetic are excited. With excitement, the endocrine glands are stimulated, and there is an outpouring into the circulation of epinephrine and thyroid secretions. Blood pressure, heart action and metabolism are stimulated beyond normal. Every movement and every word spoken by the anesthetist serves either to allay or to increase this emotional upheaval. Increased metabolism requires more air or oxygen. Ethyl chloride anesthesia is valuable in children because narcosis may be induced with larger amounts of air than can be used with any other general anesthetic.

In order to prevent psychic shock and emotional upheaval, the cooperation of the child must be enlisted and every effort made to eliminate any condition which may predispose to shock.

Another consideration is the physical fitness of the patient about to receive a general anesthetic. Children are prone to rheumatic fever, which many times leaves in its wake great damage to the heart. Anesthetics are not contraindicated in heart disease, unless the reserve force of the heart is low. If the reserve power of the heart is called on during the administration of an anesthetic, and this reserve power has already been in use, some untoward result may be expected.

Sudden death in children during the early stages of anesthesia has been noted and traced to a persistent thymic condition. For many years, in all cases in which nitrous oxide or ether was administered for oral surgical work or tonsillectomy, a roentgenogram was made. In spite of frequent evidence of suprasternal shadows, these patients were operated on successfully. We no longer employ roentgenograms in thymic conditions, and no ill-result has thus far occurred. We have disregarded the thymus in approximately 150,000 cases of ethyl chloride anesthesia, and no untoward effect has been noted.

It is conceivable that an enlarged thymus may press on the trachea during anesthesia, causing asphyxiation. Girls at the age of puberty sometimes develop an enlargement of the thyroid. This also may embarrass respiration. In these cases, the head must be kept in a position most favorable to unembarrassed respiration.

The third important consideration in the use of ethyl chloride for extraction in children is proper administration. The physiologic concept of the administration of a general anesthetic should be adopted.

Physiologically, the lungs are adapted to the reception of air with its normal percentage of oxygen. Any sudden deprivation of air, and the substitution of the vapors of a general anesthetic without sufficient oxygen, results in a sense of suffocation or asphyxiation which is conducive to shock. In shock, there is a depression of the vital centers. With respiration and circulation affected, continuation of the administration of the anesthetic may result disastrously. The technic for the administration of ethyl chloride must necessarily be a physiologic one, with sufficient air to prevent a respiratory disturbance and thus remove a condition predisposing to shock.

The safety and value of ethyl chloride depend, therefore, on the three considerations here discussed: (1) prevention of psychic shock; (2) recognition of a child's unfitness to be given a general anesthetic, and (3) proper administration.

Only too often have fatalities occurred during anesthesia for which the anesthetic has been blamed, when in reality it was the fault of the anesthetist in failing to recognize one or all of these three factors in safe anesthesia. Fatalities depend on the ability and experience of the anesthetist.

TECHNIC OF ADMINISTRATION

Assurance of sufficient air, control of fear and a knowledge of the signs and symptoms of anesthesia are the keynotes to successful ethyl chloride administration in children.

Obtaining the confidence of the child is extremely important. He must be told the truth. It is well to explain what you are going to do to put him to sleep. Suggestion is very important. I have seen many children fall asleep on the mere suggestion "Close your eyes and go to sleep."

It is far better to administer ethyl chloride to children with the stomach empty. Nausea and vomiting occur less often in children in whom digestion has already taken place.

The procedure for the induction of ethyl chloride anesthesia is simple. Since ethyl chloride tends to produce cerebral anemia, the patient should be put in a somewhat recumbent position. This is best done by tilting the operating chair backward. All garments around the throat are loosened. A rubber mouth-prop is inserted in the side of the mouth opposite the operating area, and the patient is told to bite firmly upon it.

INDUCTION

Two layers of gauze, about 4 by 4 inches, i. e., of sufficient size to cover the oral orifice with the mouth open, are

folded together and a drop or two of oil of bitter orange is dropped thereon. Standing behind the patient, the operator gently closes the nostrils with the thumb and middle finger of the left hand.

The patient is permitted to breathe air by mouth, through the gauze, for a moment. With the ethyl chloride tube from 6 to 9 inches from the face, the anesthetic is sprayed on the gauze intermittently, clogging of the meshes of the gauze by "frost" being avoided.

It has been found that inhalation of ethyl chloride for from sixty to ninety seconds permits an operating time of from three to five minutes. When anesthesia has been established, certain signs and symptoms indicate that enough ethyl chloride has been administered. These are as follows: The lid reflex is absent; the eyes begin to roll and soon become fixed upward or downward; the arm, if lifted, drops with a thud; the patient snores slightly; the conjunctival reflex and the pupillary reflex are present.

In some children, it may require from 120 to 150 seconds of induction before these signs appear. The tendency to hurry the induction must be guarded against.

As soon as these signs are in evidence, the operator is to proceed with his work without delay. The period of narcosis lasts about three minutes. Should a longer operating time be necessary, the gauze is placed beneath the nostrils, and the assistant may occasionally spray ethyl chloride on this gauze while the operator is working. Following anesthesia, there is a period of analgesia, in which the patient is conscious, but the sensation of pain is lost.

Nausea and vomiting following ethyl chloride anesthesia are to be considered. In clinics, where the anesthetic is given without regard for the time of the last meal, the percentage of nausea or vomiting is more or less high. In private practice, where preanesthetic instructions can be given, the percentage is small. R. E. Weller, chief of the extraction clinic, and Miss A. M. Leggat, dental hygienist, have just concluded two series of cases at the Forsyth Infirmary by which they tried to determine the position, postanesthetically, which would decrease the number of cases of nausea and vomiting. They found that when the patient was not moved after operation and the head was kept upright, 20 per cent of the children were nauseated or vomited. In a series in which the head was brought down to the knees, only 12 per cent were nauseated and 8 per cent vomited.

Theoretically, this should be so, since ethyl chloride may produce cerebral anemia, and thus bringing the head down helps to restore the normal blood supply to the brain, limiting the amount of nausea.

ADVANTAGES OF ETHYL CHLORIDE ANESTHESIA

The advantages of ethyl chloride anesthesia are ease of administration, rapidity of action, safety, lack of after-effects and the fact that only a small amount of anesthetic is necessary for the production of a primary anesthesia. A fear-inspiring apparatus and mask are unnecessary. Recovery is rapid. Occasional nausea, vomiting or dizziness are the only after-effects that I have noted; and this may be almost eliminated by having the patient prepared for the anesthesia by abstention from food for two or three hours beforehand. The signs of anesthesia are easy to recognize. Ethyl chloride is inexpensive and nonirritating and can be given with a great deal of air.

CONCLUSION

There have been 149,598 administrations of ethyl chloride at the Forsyth In-

firmary up to and including May, 1932. The fact that no fatality has occurred and that a great many of these anesthesias were administered by inexperienced internes, and to children who were operated on without preparation or physical examination, leads me to believe that ethyl chloride is a safe and valuable agent for short anesthesia.

It is not intended that ethyl chloride should replace nitrous oxide, ether or any other standard anesthetic. Each has its place, and when indicated, serves a definite purpose. For minor surgical procedures in children, especially for the extraction of temporary teeth, ethyl chloride is a valuable agent.

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TOOTH COLOR SELECTION*

By E. BRUCE CLARK, D.D.S., Uniontown, Pa.

WHILE residing in Samoa, Robert Louis Stevenson wrote the following to a friend in London:

Perhaps in the same way it might amuse you to send us any pattern of wallpaper that might strike you as cheap, pretty and suitable for a room in a hot and extremely bright climate. It should be borne in mind that our climate can be extremely dark too. Our sitting room is to be in varnished wood. The room I have particularly in mind is a sort of bed and sitting room, pretty large, lit on three sides and the color in favor of its proprietor at present is a topazy yellow. But then with what color to relieve it? For a little work room of my own at the back, I should rather like to see some patterns—well, I'll be hanged if I can describe this red—it's not Turkish and it's not Roman and it's not Indian, but it seems to partake of the two last, and yet it can't be either of them because it ought to be able to go with vermilion. Ah, what a tangled web we weave—anyway, with what brains you have left choose me and send me some—many—patterns of this exact shade.

In commenting on this letter of Stevenson's, A. H. Munsell says:

Thus one of the clearest and most forceful writers of English finds himself unable to describe the color he wants. And why? Simply because popular language does not clearly state a single one of the three qualities united in every color, and which must be known before one may even hope to convey his color conceptions to another.

Men in all fields of endeavor are attempting to apply color science to their immediate needs and many of them are groping in the dark for want of a fundamental knowledge of the subject. The dental profession is no exception. The situation seems almost ridiculous when we consider how definitely other sensations can be described and recorded. For example, a score of music classifies sound into terms of pitch, intensity and duration, so that it can be interpreted by anyone who reads music. The form of an object can be described by reference to its three dimensions in terms of feet and inches, and since we are familiar with length, width and depth, we easily visualize its size and shape.

Color, like form, has three dimensions, but they are not in general use. Many of us have not even been taught their names, nor the scales of their measurement. In other words, we are not ed-

*Read before the Section on Operative Dentistry, Materia Medica and Therapeutics at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

ucationally equipped to approach a color problem. Without educational equipment, we could not be expected to develop material equipment, so we are required to execute our color problems by the trial and error method. This erratic procedure will gradually be discarded when shade guides are designed to arrange tooth color into scales of its various dimensions.

COLOR DIMENSIONS

Hue, the first dimension of color, is that quality which relates it to the spectrum. When we examine the spectrum, we see that the red gradually blends into the yellow, producing the various yellow-reds which we call orange, and that the yellow gradually blends into the green and the green into the blue. In this blending process, approximately 150 different hues are developed, few of which have terms for their description.

To say that a color is red gives us only a general idea of what its hue is, for when we use the term "red," we may mean the yellowish red of scarlet or the bluish red of crimson. In color measurement, each section of the spectrum, such as red, orange and yellow, is divided into at least ten additional divisions, so that the hue can be definitely specified in respect to its exact location in the spectral band.

Now when we say a color is red, we have suggested its approximate hue, but we have referred to only one of its dimensions, because the color may be a light red or a dark red. This property of lightness and darkness is the second dimension of color and is known as "brilliance." The scale of brilliance begins at black as zero and extends to white as a maximum. All colors must be just as light or just as dark as some one step between black and white.

The third dimension of color, saturation, is a little more difficult to understand. It has to do with the strength of the hue as seen in the color. To illustrate this dimension, let us select a neutral gray and a red of the same brilliance. The gray has, of course, no hue, but if we add to it a small amount of red, it must then have a red hue, but it will be very weak and scarcely perceptible. As we add more red, the hue becomes more perceptible in the color and the color becomes more saturated. Neutral gray is zero in the saturation scale, and the spectrum furnishes a maximum saturation for all hues.

A definite reference to each of the dimensions of color is necessary for its description. We do not, of course, describe a color when we are taking a shade, but we are required to recognize and analyze color differences. The difference between a shade guide tooth and the natural tooth may be in one, two or all three dimensions, and the intelligent recognition of these differences is the most important feature in color selection. Tooth color differences are found in different individuals, in different teeth in the same mouth and in different areas of the same tooth.

The basic color of the teeth may be considered as yellow-gray, but this yellow-gray has modifications in each color dimension. The principal modification is one of saturation in which the proportion of yellow to gray varies in the basic color itself. In the gingival areas of vital teeth, the yellow is proportionately stronger than the gray. In the middle third areas, the yellow and gray are more equally balanced; but, in the incisal areas, the gray usually predominates. In other words, the gingival areas are the most saturated because, in these areas, the yellow is the stronger, but this

saturation gradually decreases as the middle third is approached and the gray increases until finally, in the incisal areas, the yellow becomes very weak and the gray predominates. In some instances, the yellow entirely disappears and the color becomes neutral gray. There are ten definite saturation steps in tooth color from the strongest gingival yellow to incisal gray.

Regardless of the proportionate amount of yellow to gray in any area of a tooth, this yellow-gray varies widely in the dimension of brilliance; that is, in some individuals, it is very light and, in others, it may be a very dark yellow-gray which is commonly known as brown.

Brilliance differences are also found in different teeth in the same denture and a very marked difference is usually found between various areas of the same tooth. Contrary to general belief, the incisal area of a natural tooth is darker than the gingival area. The degree of difference is in proportion to the relative thickness of the tooth in the different areas. The thinner portions are the darker because they permit transmission of more light, which is lost in the dark oral cavity. The thicker portions reflect more light and are therefore lighter. Many teeth on many shade guides have this order reversed and exhibit an enamel color that is lighter than the body color. The more recently developed shade guides have corrected this error.

The third modification of the yellow-grays of tooth color is in the dimension of hue. The yellows of tooth color are not always of the same quality of yellow, that is, they differ in hue regardless of how light or dark they may be, or how much gray they may contain. These hue differences in the yellow-grays of tooth

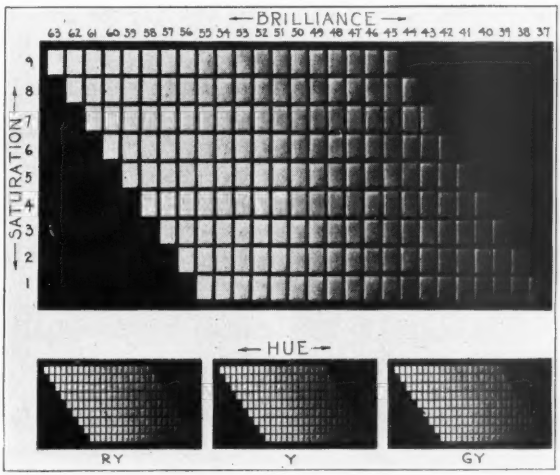

Fig. 1.—Arrangement of entire field of tooth color into equal steps of hue, brilliance and saturation, constructed in high fusing porcelain. The small charts represent the three hues of tooth color, namely, reddish yellow (*RY*), yellow (*Y*) and greenish yellow (*GY*). The upper chart is an enlargement of any one of the lower charts and is provided with a notation for the brilliance and saturation arrangement.

color do not fall outside the classification of yellow since the term yellow covers approximately ten steps in the spectrum.

To make this point clear, it may be advisable to mention that the eye is capable of resolving all of the spectrum hues into the four psychologic primaries: red, yellow, green and blue. Now since yellow falls between red and green, two different yellows can be distinguished each from the other by the fact that one will appear to be either a redder or a greener yellow than the other. Both colors are still classified as yellows.

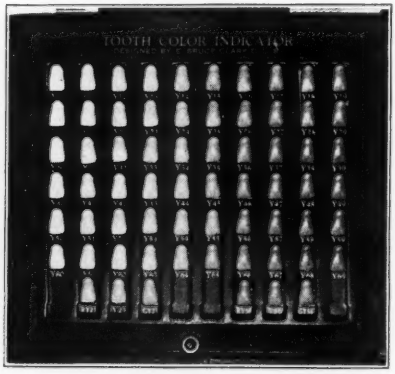

Fig. 2.—Shade guide containing sixty teeth arranged in such manner that it furnishes specifications for 342 gingival third colors and 361 incisal third colors, together with proper blending color for use with any combination of gingival and incisal colors.

When the hue of a shade guide tooth is different from that of the natural tooth, it must necessarily be a redder or a greener yellow than that of the natural tooth. It cannot be anything else. These reddish and greenish modifications of the yellow-gray of the tooth color are not widely separated steps. In fact, they are so closely related in hue that it is possible to classify tooth color into three hue groups, one of which may be considered the average yellow which occurs in approximately 80 per cent of the cases and the other two groups the reddish yellow and the greenish yellow modifications.

There is one other slight modification that is apparent in incisal areas only. When the yellow has disappeared entirely from certain areas near the cutting edge, these may appear blue from simultaneous contrast with their yellow and red environment.

Summarizing these modifications, we find that (1) the proportion of yellow to gray in tooth color varies in different

Fig. 3.—Separation of natural tooth and shade guide tooth into definite areas by pencil mark, enabling one to see colors of respective areas more clearly.

areas of the same tooth, the yellow being the stronger in the gingival areas and the gray predominant in the incisal areas; (2) the yellow-gray may be found lighter or darker in different teeth and in different individuals regardless of the proportion of the yellow to the gray; (3) the yellow-gray may be a reddish yellow, an average tooth color yellow or a greenish yellow, regardless of how light or dark it may be or how saturated, and (4) that the neutral gray incisal areas appear blue-gray.

In order to make it possible to reproduce all of these many variations in tooth color, it is quite necessary that they be classified into the three dimensions of color. This was accomplished by first establishing the limits or extent of tooth color in each dimension from an analysis of 6,000 natural teeth.[1] In other words the lightest color and the darkest color found in the teeth established the limits for brilliance; the strongest yellow and neutral gray established the limits of saturation, and the reddest yellow and the greenest yellow established the hue boundaries. It was necessary to keep accurate records of each of the 6,000 teeth because the limits of one dimension vary as the color is influenced by another dimension. For example, tooth color as a whole grows darker as it weakens in saturation and the hue becomes redder as it grows darker; but these peculiarities of tooth color were easily recognized from the graphic arrangement of the many calibrations.

To complete the classification, it was only necessary to establish each dimension in equal perceptible steps. It was found that nineteen brilliance steps were required for each degree of saturation and for neutral gray. Ten saturation steps were necessary and three hue steps, making a total of 532 different colors which are necessary and sufficient in minimum number, for the complete specification of tooth color. (Fig. 1.)

In the application of these colors to shade guide teeth, the records of analysis required that 161 of the 532 be used as both gingival and incisal colors, thus supplying 342 gingival colors and 361 incisal colors, or a grand total of 703.

In order to make this seemingly vast number of colors available for use in the dental office, the tooth color indicator has been developed. This is a shade guide of only sixty teeth which are arranged in such a manner that all of the 703 colors are made available for selection and use in high fusing porcelain. (Fig. 2.) This dimensional arrangement not only dispenses with the necessity of having a large number of sample colors, but it simplifies tooth color selection because any one of the modifications of tooth color may be chosen and used at will without the danger of affecting some unforeseen color difference; which so often occurs when we attempt to mod ify a color in the laboratory.

In the use of this type of shade guide, color selection proceeds in an orderly and definite manner. The yellow-grays are arranged in the vertical rows. The strongest gingival colors, as well as the incisal colors, appear at the top and grow gradually weaker or grayer toward the bottom. The brilliance modifications occur in the horizontal rows, light to dark from left to right. Only every other step occurs. Since there are only three hue steps, the middle one is used on the indicator because it is not difficult to estimate one hue step redder or greener when these modifications are necessary, provided a color has been selected that contains the correct amount of yellow and gray and one that is neither too light nor too dark.

The middle third or blending color is automatically selected as well as the correct brilliance relation between the gingival and incisal colors. The selection or modification of a gingival color to counteract the ill effect of oxyphosphate cements is also made automatically, and all because the classification is three dimensional, with modifications to comply with the peculiarities of tooth color.

1. Clark, E. B.: An Analysis of Tooth Color, J.A.D.A., 18:2093 (Nov.) 1931.

The method of procedure begins with the matching of the gingival third area. A color is selected containing the correct amount of yellow-gray. If the colors in the top row are too strong or too saturated, the next horizontal row furnishes the same colors one step grayer, etc., to the bottom row. Of course, this yellow-gray must be neither too light nor too dark. In the event that color Y24, for example, is too light and Y25 is too dark, Y24½ may be used. In this manner, the correct brilliance and saturation is established, but if the natural tooth should appear slightly redder than the color selected, the formulas may be changed to RY24½ instead of Y24½, which will specify exactly the same color in brilliance and saturation, but will change it one step redder in hue. In like manner, the green modification may be used.

Formulas for reproducing each of the 703 colors have been established. This work required the development of several new pigments which could be used in combination with those already known without producing a chemical reaction resulting in a different color from that desired. After several years' work, in which thousands of test mixes were fired, the total number of pigments used in the 700 colors was reduced from twenty to five, each of which is chemically inert with the others when used in a porcelain devoid of fluxes.

The physical and chemical nature of a ceramic material is as responsible for its color development as is the pigment itself. In fact, a slight change in either the physical or chemical formula of a material will affect a color change. For this reason, it is quite essential in ceramic work that the shade guide used be made of precisely the material that will be used for the restoration.

TECHNIC OF COLOR SELECTION

The first factor to be considered in taking the shade is the position of the patient in relation to the dentist, and to the source of illumination. If the shade is taken when the patient is in a reclining position in the dental chair, the restoration will not match when the patient is seen in an upright position. Taking the shade in the dental chair has other disadvantages. The chair is usually too close to the window; which makes it difficult to stand directly in front of the patient, or to change positions from one side to the other. A better plan is to have the patient seated on a laboratory stool, placed 6 or 8 feet from the window. The dentist should be seated on a stool of the same height in order that the teeth may be seen in a position perpendicular to the plane of his vision. The patient's head may be moved slightly from left to right order to avoid highlights due to the contoured surfaces. The mouth should never be opened wide, but should remain in a dark cavity as under ordinary conditions. The teeth should be viewed from different angles to make sure that the apparent color, instead of being the true color, is not due to certain light reflections.

The next consideration should be the quality or color of the illuminating light. Daylight of proper color is preferable because it is a diffused light. It changes in quality from a yellow in early morning to a white or blue, this depending on the condition of the sky; and finally back to a yellow in late afternoon. Light from a blue sky on a clear day is a blue light, and, for this reason, it is not the best quality for color selection, since the blue has a tendency to gray the yellows of tooth color. Yellow light, of course, should be avoided because it increases the intensity of the yellows, and they will

appear quite differently when seen in blue or white light.

White light is of average quality and is most suitable for color work in dentistry. The best source of white light is an overcast sky near the middle of the day. It may also be secured from artificial sources which have been provided with proper color filters to absorb the excess of yellow rays. Most so-called daylight lamps do not produce a white light, and unless their color temperature is known, they should not be purchased. Color temperature is the standard grading or classification of the quality of illumination for both artificial and daylight sources. For best results, it should range between 4,500 and 6,000 K. The mazda daylight lamp is rated at approximately 3,600 K.

In ceramic work, the different areas should be matched separately. Two areas are usually sufficient, the gingival and the incisal. If there is a decided contrast between the colors of these areas in the same tooth, it is advisable to select a middle third or blending color. The use of this third color will permit the blending of the other two colors without the production of a sharp line of contrast between them when this feature is not desired.

It is sometimes difficult to keep the eye focused on one area for any appreciable length of time. The eye has a tendency to rove over the entire surface of the tooth, but this can be prevented by dividing the surface of the tooth into definite areas with lines drawn by a fine pointed lead pencil, as in Figure 3. Similar lines should be drawn on the shade guide tooth.

Colors in the natural teeth do not always appear as a solid color, especially in the incisal third area. Blue-gray spots and lines often appear above the cutting edge and sometimes dark yellow spots appear just above these. If these individual areas are not to be reproduced in the finished crown, the dentist should take the shade at a sufficient distance from the patient that the eye is unable to see the outline of these spots. The tooth will then appear to be of a solid color. A much better effect is produced if these spots are reproduced in the restoration. When this is desired, an area directly above that containing the translucent areas should be isolated with pencil marks and the shade of it taken. This shade should then be used for the entire incisal half of the crown, for it will provide the correct background to receive the darker colors or stains, whichever are to be used.

The teeth of older persons sometimes seem to be blotched with thin patches of white irregularly distributed over their surfaces. It is sometimes difficult to isolate the background color in cases of this kind and, when this is true, select a shade that matches the tooth from a distance, and then use a shade about two steps darker. The placing of the white blotches on the surface will restore the shade to the one taken. This procedure makes a very natural appearing tooth. A little experience is necessary before this can be accomplished without error. Whenever the color of a crown or inlay can be broken up in some manner, as above stated, this should be attempted, and although the colors are not chosen perfectly, the general effect will be more pleasing than a crown or inlay made of solid colors. It is these solid colors that make artificial teeth look false.

Before the patient is dismissed, a careful examination of the surfaces of the natural teeth should be made to determine the nature of the finish required on the surface of the crown or inlay. A

jacket crown or an inlay that is improperly glazed may have the correct color requirements but still fail to match the natural tooth. It is sometimes necessary to polish the finished case to imitate a highly polished natural tooth surface, which differs materially from the glassy appearing surface of an overglazed porcelain. A too highly glazed surface may be dulled with acid and then polished to the desired luster.

A record should be made of the colors selected and a chart drawn showing the location and extent of the gingival, middle third and incisal colors and the locations of enamel checks, stains, translucent areas, etc., unless the last are to be reproduced by surface staining; which should be done with the patient present.

In the construction of a jacket crown, there is one color factor that should be kept in mind while the preparation is being made: Best color results are secured when the labial wall of the finished crown is at least 1 mm. in thickness. Many exceptions are, of course, required of this rule. One should make all provision possible in the preparation to allow for a thickness of 1 mm., and this thickness should be uniform in the crown walls because thin areas are often unsightly after cement has been placed behind them.

COLOR AND THE CEMENTING MEDIUM

The color of porcelain crowns or inlays is influenced by the color and kind of cement used for setting them. The silicate group or translucent cements are usually used for inlays in order to permit the transmission of light from the tooth structure into the porcelain and vice versa. The color of the silicate is not important. In fact, a colorless material is often used to advantage because of its additional translucency. Silicate cements are contra-indicated if the crown or inlay covers discolored tooth structure.

When silicate or translucent cements are used for setting a jacket crown, the color of the cement is not a contributing factor in the final result. Instead, the cement permits a transmission of light into the dentin, which acts as the reflecting medium, thus affecting the color of the restoration. Since the dentin is in some cases much darker or lighter than in others, the use of extremely translucent cements produces varying colors. It is possible that a correlation of dentin and porcelain colors may sometimes be established that will overcome these unfavorable results.

The oxyphosphate group, which are opaque, are generally used in connection with jacket crowns and facings. The use of an opaque cement arrests the transmission of light and acts as a reflector, turning the light back through the porcelain. This saturates the color of the restoration; that is, it strengthens or increases the yellow content of the yellow-gray. The amount of this increase in strength depends, of course, on the saturation or strength of the yellow in the cement and can be overcome, within certain limits, by using a cement of a more neutral or grayer color. Beyond this limit, a gray cement is very detrimental to the color of the crown or inlay, making it appear dead, as though it were a devitalized tooth. This is true because natural tooth color results from the presence of the saturated dentin lying behind the gray enamel. The use of a cement that is too gray reverses this physical condition, unless the crown, etc., is intended to match a devitalized or a very dark tooth.

The necessity for using a gray cement in a jacket crown may be avoided by the use of a grayer porcelain for the gingival

area, permitting the use of a stronger or more saturated cement. This will give the cemented crown a more life-like appearance since it imitates the physical color conditions of the natural tooth. When a grayer color is selected for use in this manner, it must not be lighter or darker than the natural tooth or of a redder or greener yellow; it must be grayer only. This would be a very difficult selection to make if it were not for the color indicator, which makes it automatically.

A color one step grayer than that originally selected on the indicator is usually sufficient unless the crown wall is very thin; in which case, a color two or sometimes three steps grayer can be used. This modification is only necessary in the lighter shades of teeth, since a grayer cement may be used with a dark shade without producing an unfavorable result.

It is sometimes necessary to modify this procedure in another manner because of the fact that plain porcelain material is gray and not white. For this reason, the gingival areas of very light teeth sometimes are found to contain a stronger or more saturated yellow than it is possible to reproduce in porcelain. When the cement is not sufficiently saturated to correct this condition, a color one-half or one step lighter may be used, which will permit the use of a darker and therefore more saturated cement, thus effecting a match.

Trial mixes should, of course, be made for each case. The powders should be mixed together in a small porcelain jar and a sample of this mixed with glycerine or any medium found more suitable and placed in the crown, which is then seated on the preparation. The mixture of powder and water does not give the identical color that will be secured when cement is finally mixed with its liquid and has completely set. The setting process has a slight tendency to gray the color, and this fact must be taken into consideration.

In concluding this discussion of the many factors in the successful selection and reproduction of tooth color, it might be advisable to stress the importance of a clear conception of the three dimensional nature of color, especially in its relation to tooth color. When the various modifications of the yellow-grays of tooth color become so firmly fixed in our minds that confusion of one with another is obviated, color problems will become a matter of technic, and technic is the least difficult phase of any problem to master, provided a definite plan of procedure has been established.

BROKEN INCISAL TIPS*

By FLOYDE EDDY HOGEBOOM, D.D.S., and ANGUS GUY HOBBS, D.D.S.,
Los Angeles, Calif.

RESTORATION of the fractured permanent central incisors is without doubt one of the most difficult operations in dentistry; and, owing to the increasing complexity of modern civilization, accidents involving injury to this tooth seem to be on the increase.

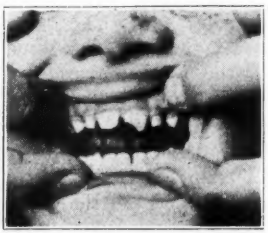

Fig. 1.—Fractured central incisor in boy, aged 7½.

The following technic has been found very practical in restoration of fractured incisal tips, which are classified as follows as to the degree of the break:

First degree: The tip is broken with sufficient dentin overlaying the pulp to provide against thermal shock.

Second degree: The tip is broken, with only a thin layer of dentin overlaying the pulp (a near exposure).

Third degree: The pulp horns are exposed by the fracture.

*Read before the Section on Mouth Hygiene and Preventive Dentistry at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 13, 1932.

The majority of first degree fractures are so slight that simple smoothing of the rough edges will be sufficient. The difficult cases to handle are the Class 2 and 3 cases, as most of these fractures occur at from 7 to 12 years of age. (Fig. 1.) In these early years, the tooth root

Fig. 2.—Case showing large funnel-shaped pulp canal. At this age, no attempt should be made at permanent restoration.

is not completely formed, the pulp is very large and the apical foramen is a large funnel. (Fig. 2.) No restoration of a permanent nature is practical, and consequently a protection must be built which will allow the tooth root to complete its formation and the horns of the pulp to recede sufficiently that a permanent restoration may be placed.

In third degree fractures, the situation is almost hopeless, yet every effort should be made to maintain the vitality of the tooth, in the hope that the pulp will continue to build in dentin at the apical foramen.

The patient should be made to understand that the main object of the protection is not esthetic considerations, but maintenance of the vitality of the pulp to an age when a porcelain corner may be placed. The following technic deals with second and third degree fractures.

The child should be brought in immediately after the accident if possible. Soothing applications are made to the tissues of the mouth and the fears and distress of the child and the parents al-

Fig. 3.—Amalgam die, with wax crown mounted and finished gold casting ready to be cemented on tooth.

Fig. 4.—Gold casting cemented on tooth with sedative dressing immediately over exposed dentin.

leviated. A piece of 38 pure gold is always kept on hand for these cases. A strip is cut wider than the distance from the incisal to the gingival margin and carefully worked around the tooth with the ends on the lingual surface. The ends can be either lapped or pinched with band pinching pliers, and carefully removed and soldered. The open thimble of gold is then festooned to fit the gingival margin and replaced on the tooth for lapping over the labial extension. The incisal end is closed.

The gold crown is then carefully placed on the tooth and, with orangewood sticks and ball burnishers, carefully burnished to the tooth. The corner over the fracture is built out to contact the next tooth or to its proper proportions. This leaves a hollow between the gold and the fractured portion of the tooth, which will be occupied by the sedative dressing. The

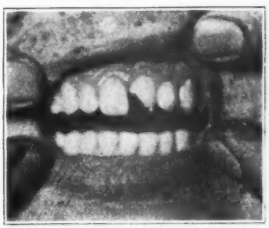

Fig. 5.—Tooth with large fractured corner in a girl, aged 15½.

Fig. 6.—Finished porcelain corner with platinum post. When the fracture occurred, immediate attention was not given the tooth and loss of contact occurred, which makes the permanent restoration look slightly overlapped.

tooth is carefully dried off and the exposed portion wiped with phenol and alcohol. A paste of zinc oxide and oil of cloves or carbolated resin is carefully painted over the fracture. A creamy mix of permanent cement is placed in the gold crown and the crown gently oscillated to place, care being used not to

displace the sedative dressing placed over the fracture.

The parents are instructed to see that the child has plenty of rest and is kept on a liquid diet for a few days, so that no undue pressure will be brought to bear on the tooth. In a few months, when the tooth has tightened, the child is brought in and the crown carefully peeled off without disturbing the cement corner left under the crown. A copper band is now fitted and a compound impression taken of the tooth crown. A silver amalgam die is made with a sufficient length of root to grasp. With a very thin piece of gold wax, a wax crown is made on the silver die. The silver die should be well oiled so that the wax pattern can be removed. The wax pattern is invested and cast in one of the whiter golds which will not reflect the light and be so conspicuous as the yellow golds. (Fig. 4.) This crown is then cemented on over the entire tooth in the same manner as the original crown, the operator being careful to include a sedative dressing over the exposed fracture. This crown is to remain until the child is in his teens, preferably aged 15 or 16, before any attempt is made to restore the tooth with a porcelain corner.

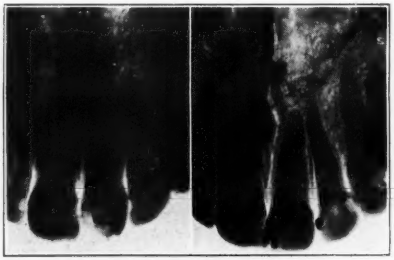

Fig. 7.—Tooth before corner was placed and after porcelain restoration was made. The position of the platinum post and, incidentally, the presence of a supernumerary tooth are to be noted.

Fig. 8.—Fractured central incisor in girl, aged 13½, with two-pin porcelain restoration.

Fig. 9.—Fractured central incisor with two-pin porcelain restoration.

Fig. 10.—Double fracture of central incisors in a girl, aged 10½.

In third degree fractures, when there is a definite exposure of the pulp, the success of the operation depends on the extent of the fracture and whether the vitality of the tooth remains.

In restoring these corners with porcelain, the following technic is found to be practical. (Figs. 5-9.)

The corner is prepared with flat seats

on the mesial or distal and on the incisal aspect where possible. A small platinum pin is placed toward the lingual aspect of the mesial or distal margin. A copper band is placed over the tooth and a compound impression taken of the cavity preparation with a platinum pin in place. After the impression has been chilled and removed, a very thin coating of wax is placed on the platinum pin. Then, an amalgam die is made with a sufficient root to grasp. The compound is softened in hot water and the copper band gently removed, the pins being left exposed in the amalgam die. The platinum pins are grasped with a pair of pliers and are

Fig. 11.—Teeth before restoration and after porcelain restoration. The position of the platinum posts is to be noted.

gently loosened until they move freely in and out of the holes. The pins are removed from the die and a platinum matrix swaged over the cavity preparation. The pins are then thrust through the platinum matrix into the hole or holes in the amalgam die. The cavity is covered with sticky wax and, with the platinum pins held in place, the platinum matrix and pins are removed from the platinum die and carefully invested in McBean's high temperature investment. After the mass dries, it is placed in the oven and the temperature brought up to 2200 F., when the oven is allowed to cool off and the tray is removed. When the mass is cold, the correct shade of porcelain having been selected, the corner is built up to the approximate shape of the restoration. From this stage, the firing is carried on as in any other porcelain restoration. The finished porcelain corner may be cemented to place with silicate cement or ordinary cement according to the operator's wishes.

This technic will care for the majority of fractures of this character. Of course, variations may possibly arise, but a technic of this kind, if properly followed, will care for the average case.

At times, the occlusion makes it nec-

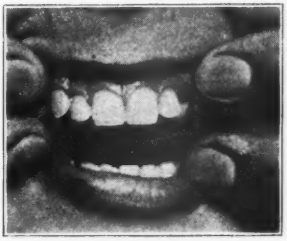

Fig. 12.—Finished porcelain restorations.

essary to back the facing up with a gold casting such as a thimble type or an inlay restoration. Then porcelain of the appropriate shade and designed to fit the window can be baked. The gold should be a very strong alloy, assuring maximum strength and minimum thickness.

The restoration of the broken incisal tip is a very difficult type of operation under any circumstances, and any technic which makes possible the restoration of esthetic values with a minimum loss of tooth structure is to be welcomed by those who are faced repeatedly with this type of case.

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ANATOMY IN RELATION TO EDENTULOUS IMPRESSIONS*

By M. G. SWENSON D.D.S., New York City

FULL dentures should have a general anatomic outline that is tempered by the particular outline of the individual case. The dentist should have a general mental picture of typical cases and then, by examination, definitely visualize, before starting, the case at hand. A good operator must have a clear idea of what a finished cavity preparation is to look like before starting it. We must do likewise to make the most of denture construction.

In this presentation, I shall for the most part, discuss the borders of the maxillary and mandibular dentures. An attempt will be made to show why dentures have a general anatomic outline that is common to all.

How can a prognosis be made without studying the case in advance? Mouth size, ridge area, width and height and ridge relations are all separate factors to be accounted for. The patient's health, age, sex, temperament, ability, social position, and life expectancy are factors in prognosis. Tongue size and soft tissue depth also have a bearing on the result. The amount of time which has elapsed from the loss of the teeth to the time of the construction of the dentures has much to do with the outcome. Many cases give us trouble because the patient does not know what to expect. The education of the patient on this point is extremely important.

The action of the buccinator muscle affects both the upper and lower denture in so many locations that it should be given unusual study. Its fibers are interwoven at the corner of the mouth with those of the orbicularis oris. It has visible tendinous attachments to the maxilla and mandible which correspond to the bicuspid areas on the borders of dentures. The fibers of the muscle run horizontally in a wide flat band from the orbicularis oris, then cross to the inside of the ramus back of the mandibular third molars, and join those of the superior constrictor muscle of the pharynx, which is the beginning of the pterygomandibular raphe. The buccinator muscle is in fact a continuation of the constrictor muscles of the pharynx which control swallowing.

The relation of the origin to the insertion of the orbicularis oris and its attaching muscles, in the edentulous patient, demands careful consideration from the prosthodontist. The principal conditions that influence this group of muscles are: the thickness of the border of the maxillary denture, the anteroposterior position of the upper teeth and the amount of opening between the mandible and the maxilla. If these are not properly considered, the patient, whether old or young, assumes a senile

*Read before the Section on Full Denture Prosthesis at the Seventy-Fourth Annual Session of the American Dental Association, Buffalo, N. Y., Sept. 15, 1932.

appearance. The corner of the mouth drops and a thinning of the upper lip occurs which is due to allowing the orbicularis oris to be misplaced backward and upward. This misplacement moves the muscle close to the insertion of its attaching muscles and thus the functional contraction is lost. This accounts for the change in appearance which is not due to age as is commonly believed.

The maxillary labial frenum is a structure with which everyone is familiar, yet how many dentists give consideration to the various shapes that this attachment presents? Expression and retention are dependent on its adaptation to the conditions to be met.

The arch between the labial frenum and the upper buccinator attachment is without a direct muscle attachment. The maxillary tendinous attachment of the buccinator pulls away toward the distal aspect. It varies in height and width and should be carefully fitted to obtain the greatest degree of retention.

The inferior portion of the zygomatic process, which is extremely hard, often comes in contact with the maxillary border of the denture. It is found just anterior to the buccal space and usually the denture needs to be relieved in this region to prevent soreness and aid retention. The resorption of the cancellous alveolar ridge is more rapid than that of the bone of the more permanent zygomatic process; hence, excess pressure is liable to fall on this area, if the denture is not properly relieved.

The buccal space is not properly filled by most dentures because its height and width are not studied. There are many variations of this space. A direct relation between the shape of the tuberosity and the buccal space exists. The larger the tuberosity, the higher the space. Apparently the attachment of the buccinator muscle to the maxilla opposite this area governs the extent of the space. The position of the ramus in relation to the tuberosity is also a factor in determining the border width in this region. A proper filling of this space gives a tissue or cheek seal as well as a ridge seal.

The postdam area may be divided into three parts: (1) the narrow portion of soft tissue back of the tuberosity; (2) a wider area of soft tissue back of the posterior palatine foramen, and (3) a narrower area again, between the torus palatinus and the movable soft palate. The vibrating line of the soft palate posterior to the junction of the hard and soft palate governs the posterior border. There are three types of soft palate forms according to their vibrating lines: the most favorable, with a wide area; the least favorable, with a very narrow area, and a medium movable area between these two.

The pterygomaxillary notch is a narrow area between the pterygoid process and maxillary bone which is filled with soft tissue. It is used as a part of the postdam area. Many impressions fail because the postdamming is not extended far enough back of the tuberosity into this notch.

The tuberosity is the posterior end of the alveolar process of the maxilla. The inclination of the maxillary molars is such that an undercut may be present on the buccal surface. The removal of this undercut is necessary to secure a seal at the top of the fold. The types of the tuberosities usually have a direct relation to the soft palate form. The high tuberosities have what we may call a class three, soft palate form; that is, it has a narrow postdam area and the posterior line of the denture is brought forward. The low tuberosities usually have the opposite, soft palate form.

The foveola palatina are indentations in the soft tissue on either side of the median line just posterior to the junction of the hard and soft palate. These landmarks are an aid in determining the posterior length of the maxillary impression, which is where the soft palate becomes movable, or its vibrating line.

The anterior palatine foramen is on the median line just linguad from the crest of the ridge. This area requires relief at the time of the denture construction, and more relief as the denture settles. The incisal papilla is a nodule of soft tissue to protect the anterior palatine foramen. This nodule of soft tissue serves to locate the foramen.

The torus palatinus or hard area is found to be the entire flat portion along the median line. This area is relieved in the impression and also in the finished denture, this preventing rocking and aiding retention. Its extent may easily be determined on the cast or by palpating in the mouth. Some types have no hard area, some hard wide areas, while others have a low and exaggerated torus palatinus. The relief should be in accordance with the type that is found.

The posterior palatine foramina are located in the palate bones. A sufficiently thick pad of tissue usually protects the nerves and blood vessels from denture pressure, but relief is necessary in some cases.

The lower labial frenum attachment is usually not relieved to exact height and width to insure stability. The labial frenum may be fan-shaped or it may be v-shaped. It should be relieved to its full depth to give expression, aid retention and prevent soreness. The arch between the frenum attachment and the tendinous buccinator muscle attachment does not have direct muscle attachments. It has a characteristic arch form the same as that of the maxillary impression.

The lower tendinous attachment of the buccinator muscle may be very high around the border, close to the crest of the ridge, so that an overextension causes the denture to be displaced on contraction of the buccinator muscle.

The side attachment of the buccinator muscle to the mandible starts in the bicuspid region and, after a sweeping curve, crosses just back of the third molar. The buccal flange of most mandibular dentures shows that this fact is often disregarded. The term "side attachment" is used advisedly because the muscle in this region is attached by fascia and not fibers. The contraction of this muscle is not at right angles to the line of attachment; hence, the term "side attachment." The buccal flange must necessarily be shortened in the third molar region.

The retromolar pad or tubercle of soft tissue helps to determine the posterior length of the mandibular denture. The buccinator muscle crosses to the lingual aspect of the ramus just posterior to this area and does not allow impingement. Much valuable bearing is lost if the impression is short of this point.

The lingual border of the lower denture from the bicuspids back is the most abused area of dentures. This portion is determined by the posterior half of the attachment of the mylohyoid muscle. This muscle, when relaxed, allows the impression to go below the mylohyoid ridge, causing an overextension of the flange of the denture. Hence, the denture is displaced on contraction of the muscle. Restriction of tongue movement is the only means of tolerating the denture. In the bicuspid area, the mylohyoid is submerged beneath the sublingual gland.

This sublingual gland area cannot be

impinged on. The gland rests upon the anterior fibers of the mylohyoid and is raised by it; hence, the border starts from the second bicuspid region. The lingual frenum attachment may be fan-shaped or narrow. It may be low, but usually comes close to the crest of the ridge. Tongue and denture function depend on its correct adaptation.

The torus mandibularis is a hard bony projection in the bicuspid region on the lingual side of the mandibular alveolar process. The unyielding nature of this area is often the cause of considerable soreness. It is found in too many cases to be called a pathologic condition.

Immediately on the loss of several posterior teeth, especially in the mandible, the tongue and cheeks begin to fill the space thus created. When these have been missing for some time, the insertion of dentures calls for a redevelopment of the tongue shape. It is not generally realized how completely the tongue fills the oral cavity, even at rest. An important point is the position of the lips in relation to the anterior teeth. The maxillary anterior teeth govern the position of the lower lip; in other words, the lower lip in repose rests on the upper teeth.

CONCLUSION

I have tried to show that a denture outline form is just as essential as an outline for a finished cavity preparation or the outline of a three-quarter preparation. Certain principles are laid down to which individual tooth preparation should conform, and these must be tempered by the conditions surrounding the particular tooth. No great difficulty attends the acquiring of the necessary knowledge to put these principles into general practice. There are many important phases of full denture construction, but surely this is the foundation and cannot be neglected if we are to have the most successfully functioning dentures.

DISCUSSION

P. C. Lowery, Detroit, Mich.: Anatomic features are not always constant. By experience only can we learn the variables that occur in anatomic structure. Therefore, we are guided by, and must deal with, the anatomic parts as we find them, always recalling the axiom that every denture should cover as much area as possible without interfering with muscular activity. The length and width of the border of both maxillary and mandibular dentures are important as they place the tension and determine the support of the muscles of the mouth. We should be as familiar with the anatomy of the muscles of mastication and expression as with the anatomy of the denture border structures, if we are to attain the best possible results in full denture construction. The patient should masticate nearly equally on both right and left sides of the mouth in order to maintain the original position of the dentures, because, when ridge relations and denture bases change, muscles function in an abnormal manner. Function destroys, maintains or restores the facial expression of those wearing artificial dentures, this depending on the ability of the operator to place and maintain the stress area of the denture bases in an advantageous position as to the traction of the muscles of mastication and expression. The size and shape of the tongue, as we observe it, are dependent on its relation to adjacent structures. The period of change from the normal to the abnormal is much more rapid than the return to normal after correction. Dr. Swenson states that the education of the patient as to what he may expect from his dentures is extremely important. This fact cannot be overemphasized. The patient and the operator must understand each other thoroughly in order that the utmost in mutual satisfaction may be secured. Just as anatomic structure does not follow the letter of the book, so the written word in psychology does not always fit the patient. To gain experience in this important field, we should occasionally take inventory of our previous successes and failures by reviewing the factors in a particular result. With reference to the paragraph on relief, we should always keep in mind that the more relief a dense osseous area is given, the more the resorption of the cancellous struc-

tures is hastened. Excessive relief causes continuous suction or pull of the border tissues toward the area of relief. Whether or not accompanied by discomfort, it always has its harmful effect. Excessive relief may mean a short term spectacular denture, while proper distribution of relief will provide a longer term and a more satisfactory denture. Dr. Swenson has minimized the importance of his paper in his conclusion by comparing the denture border outline to that of a three-quarter crown preparation.

THE BURDEN OF SCIENTIFIC LITERATURE

I mentioned the intolerable burden of the literature. I am one of the editors of a journal—a thankless, and to oneself at least a profitless task. I know how difficult and unpleasant it is to attempt to put a brake on publication. Something, however, must be done, or science will perish under its own weight. The days are already too short to read all that appears in print, however diligent one may be; and the financial strain is so great that even the Royal Society of London now does not take a number of important periodicals. The trouble is that science and publication have become a business: the practice of advertisement has crept in: professional advancement depends—as I said at Boston three years ago—upon the number of kilogrammes of paper published. Various devices are employed to this end: (1) the same research is described, usually in slightly different form, in different journals; (2) a paper is split up into many separate parts; n papers are a better advertisement than one, although the total information conveyed is the same; (3) the names of authors are arranged in every possible order, to the great confusion of indexes and catalogues: if there be r authors the paper must be split into r parts to allow each author's name to come first; (4) papers are written at unnecessary length, with unnecessary duplication of data in tables and figures: historical references, many of them never verified, are given ad nauseam: pages, sometimes sheets, of undigested results are exposed, where an average and a standard deviation would be sufficient; (5) personal animosities and grievances are ventilated—which add the interest and dignity of a dog-fight to scientific discussion. Authors, however, are not the only sinners: editors and publishers, with certain honorable exceptions, are to blame. The first condition of proper control is that scientific journals should be owned by scientific societies, not by commercial firms, so that it is in nobody's interest to publish too much. The second condition is that the editors should be firmly supported by the societies for whom they work. In some countries, it is urged, physiologists have so little confidence in their colleagues that they would not submit to an editorship undertaken seriously. I hope and believe that in no country is the general feeling so bad. Everywhere there are unreasonable and truculent people, but the editors appointed by a powerful national society, in dealing firmly with these, are assured of the support and gratitude of the great majority of their colleagues. I feel, therefore, that this Congress would act wisely in appointing an international committee to consider the publication and cataloguing of physiological and biochemical papers. Apart from scientific discussions and the making and renewing of personal friendships, this is the most important way in which it could aid in advancing our subject. Not only in our journals, however, but at our meetings, not only in the written but in the spoken word, most of us miss our opportunities. The art of making a communication to a scientific assembly is one which very few know. Too often a blackboard, or a set of lantern slides, is packed with indigestible data and the matter is expounded in detail, and at increasing speed, until the chairman's bell rings. There is no excuse for telling busy people in 15 minutes what they could perfectly well read in 5. The advantage of the spoken over the written word is this: that by emphasizing the essential ideas and difficulties, stressing the dramatic element in discovery, it can add a humane flavor to scientific discussion. Our colleagues do us great honor by coming to sit at our table: let us make sure at least that the meal we provide is not cold.—"Energy Exchange in Muscle and Nerve," by A. V. Hill, in *Arch. D. Sc. Biol.*, January, 1933.

The Journal of the American Dental Association

212 East Superior St., Chicago, Illinois

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Published by the American Dental Association

All expressions of opinions and all statements of supposed facts are published on the authority of the writers over whose signature they appear, and are not to be regarded as expressing the views of the American Dental Association, unless such statements or opinions have been adopted by the Association.

Communications intended for publication in the scientific or literary pages of THE JOURNAL should be addressed to the Editor. All advertising or business matters should be sent to the Business Manager.

Subscription is included in the annual membership dues. The subscription rate to non-members is $3.50 a year in advance, this rate applying to both domestic and foreign subscribers. All foreign subscriptions are to be paid in United States money.

Editorials

THE DENTIFRICE QUESTION AND THE COUNCIL ON DENTAL THERAPEUTICS

In the routine work of the Council on Dental Therapeutics consideration of dentifrices seemed imperative. Not that it was deemed more important to study dentifrices than to evaluate the therapeutic agents that concern the practice of dentistry, but that the widespread interest in dentifrices through extensive lay and professional advertising, and the fact that so many of the populace are using tooth pastes or powders led to questions coming to the Council from the profession as to the virtue of these products.

The Council accordingly, early in its deliberations, considered it necessary to formulate its policy regarding dentifrices, and while the detailed specifications cannot all be enumerated here, the following may serve to indicate the attitude of the Council in its reaction to this question:

Dentifrices are defined as preparations (pastes, powders and liquids) which aid in the removal of débris from tooth surfaces.

Tooth pastes and powders on the market today may in general be placed in several groups or combination of groups; namely, those depending primarily on soap for their cleansing action; those containing small amounts of organic acids; those containing magnesia magma or other alkaline substances and those containing other substance or substances, such as potassium chlorate, calcium phosphate, organic or inorganic astringents, antiseptic or germicidal substances and enzymes. These substances are generally admixed with chalk for abrasive action and incorporated in paste form by glycerol (or glycerite of starch), tragacanth, acacia or other pharmaceutic binders.

Many dentifrices on the market today are unnecessarily and irrationally complex in composition. The Council desires to point out that the aims of rational therapeutics and "oral hygiene" are defeated by the use of complex mixtures, not to mention the large economic waste in the sale of highly complex mixtures when simpler combinations are just as effective. This is in keeping with the well known observation that dentifrices have no direct demonstrable therapeutic action. The sole function of a dentifrice is to aid in keeping the teeth clean by the removal of loose food débris by the mechanical use of the toothbrush.

The latter statement requires repeated emphasis. The claim of therapeutic or bacteriostatic virtue in a dentifrice borders on the ridiculous. Granted for argument that, in certain of these products, there may be manifest a bacteriostatic action in a test tube, the fact remains that in the limited time consumed in brushing the teeth in the mouth any possible therapeutic effect is so infinitesimal or ephemeral that in the vernacular "it doesn't mean a thing." To claim tangible therapeutic benefit from the use of a dentifrice is exploitation pure and simple, save that it is neither *pure* nor *simple*. More and more, the sentiment is prevailing among professional men and even among the laity that false claims in advertising are to be discountenanced, and false claims for dentifrices are no whit more commendable than for any other product. One of the functions of the Council is to eliminate misleading or harmful statements from the preparations that are submitted for acceptance.

Certain provisions for the inclusion of dentifrices in Accepted Dental Remedies are as follows:

Dentifrices (with especial reference to those advertised to the public) may be accepted for inclusion in the list of "Accepted Dental Remedies" provided:

Claims are strictly limited to their efficacy as an aid in the hygiene of the oral cavity and particularly to their mechanical cleansing properties.

No unwarranted therapeutic, chemical or bacteriologic claims are made or inferred in their exploitation.

Therapeutically suggestive names are not used as a brand name.

The brand name is not indicative of a component which does not possess proven therapeutic properties or other inferred properties implied in the name.

There is no conflict with the rules of the Council.

The provisions in reference to proprietary names will not be retroactive.

The Council has further provided that dentifrices will be accepted for a period of one year in contrast to the usual three year acceptance clause for other classes of products to be listed in "Accepted Dental Remedies." At the end of this period, the evidence for reacceptance will be examined by the Council. If no conflicts with the rules or provisions of the Council appear, the product will be retained for a further period of one year.

The feeling is increasing among our members that there is an urgent need for the early publication of a small book on accepted dental remedies under the auspices of the Council. We strongly advocated this in the June, 1932, issue of THE JOURNAL, and there now seems a likelihood that the volume will be brought out. Some of the material has already been published in THE JOURNAL, and succeeding chapters are to be issued monthly till the work is completed, after which it will be gathered in book form and issued at a cost within the reach of all. Just when the book will appear it is of course impossible to say at this time, but unless there is unusual delay, it should be issued some time early in the coming autumn. We predict for this book a very cordial reception, not only because of the demand that has already been created for it, but also because of the intrinsic value that such a work must possess.

AN IMPORTANT CURRICULUM STUDY

In 1930, the American Association of Dental Schools appointed a committee of five deans of dental schools to prepare a plan for carrying out a curriculum survey for use in dental educational institutions. From the time of the organization of the first dental school in 1840 till now, no really systematic or comprehensive study has been made of the dental curriculum, and the need for this study must at once be apparent.

To finance this survey, the Carnegie Corporation of New York donated the sum of $20,000, and at the recent meeting of the Amer-

ican Association of Dental Schools, April 21-23, 1933, an announcement was made of an additional donation of $10,000, making $30,000 in all.

The names of the committee charged with this study are as follows: Wallace Seccombe, chairman, Toronto, Canada; John T. O'Rourke, secretary-treasurer, Louisville, Ky.; Arthur D. Black, Chicago, Ill.; H. Edmund Friesell, Pittsburgh, Pa., and Henry M. Semans, Columbus, Ohio.

The committee has as its educational advisers Floyd W. Reeves, professor of education, University of Chicago, and W. W. Charters, director of the Bureau of Educational Research of Ohio State University.

A full time executive secretary has been appointed in the person of L. E. Blauch, Ph.D., and he has been installed in office at 311 E. Chicago Ave., Chicago, Ill.

The volume of work accomplished by this committee up to date has been impressive. Subcommittees of dental teachers have been appointed from time to time in fulfilment of a plan to make the study as inclusive as possible, and every phase of dental health service as it relates to the training of students is being carefully formulated.

Much consideration is naturally being given to the possible and necessary contacts between medical and dental practitioners, a clear understanding of which should be instilled in the minds of every student of dentistry. Of equal importance is a study of the ethical relations between the public and the practitioner, and this should be a leading influence in dental training from the earliest days of the student's entrance in a dental school. Orthodontia and its relation to the dental curriculum presents one of the major problems of dental education today, and this the committee is studying with some care. The keenest interest is being manifested in this problem, not only on the part of our college authorities but also by the profession generally, and it is confidently hoped that this study may succeed in throwing much valuable light on it.

There is apparently not a single phase of the dental curriculum that is being neglected in this survey, and every subcommittee is entering into the work with an enthusiasm that cannot fail to bring

results. We predict that when the final report of this committee is presented, which will be at the meeting of the American Association of Dental Schools in Chicago, in March, 1934, a definite advance in dental education will have been registered. But this fact should be emphasized, that nowhere in the activities of the main committee or any of the subcommittees is there the attitude or even the slightest intimation that the last word is being said on the subject. It must be recognized as practically a pioneer effort, and subject, as are all such efforts, to future revision as the oncoming needs of dental education are manifest. As Dean O'Rourke has aptly stated in a report on the objectives of dental education, and his statement is equally apropos to the entire curriculum survey: "As a means of stimulating work, it is believed that this preliminary study has served a useful purpose." This is a conservative and modest statement of the attitude of the entire committee and one that must be commended by the profession generally. As has already been intimated, the need of this survey is eminently apparent, and our dental educators are fortunate in the personnel of those who are conducting it.

PUBLICITY FOR DENTAL RESEARCH

Less than fifteen years ago, the word "research" had a foreign sound in dental councils. Almost suddenly, it became the earmark of scholarly aspirations, the password to intellectual conclaves. Not that there had not been notable investigations made previous to that time by men whose eminence time has not lessened, but that, until then, dentistry either organizationally or academically had not conceived it as a responsibility. It is hard to believe today that so short a time ago, such topics as "What Is Research?" and "What Is the Place of Research in Dental Schools?" could have found a place at associational and divisional meetings. When papers presenting research were read or research findings were presented in other ways at those meetings, the attendance was bitterly disappointing. How times have changed!

As an immediate postulate, scholarship equal to the task was in

debate and entrance requirements for the schools were more than a moot question. Excitants and depressants of the issue waged war. A high-school preparation was enough for dental students, urged one; we must have more preparation, urged another. Those who upheld the torch of learning were frequently burned.

Times have changed — changed with unbelievable rapidity. School authorities no longer shiver when evaluating credits, or, with hesitant fingers, play with the letter of the law. Dentistry as a biologic thing has triumphed and scholarship is a moored essential to its acquirement and practice. As a result—research; research in torrents and floods; an epidemic of research. Something of it might have been expected, but who could have prophesied the present reality? It compares with the recent prosperity in the way it absorbs us. A voice raised in objection to the economic mode was regarded as lunacy. Even so here.

Always when production is quantitative, quality decreases. The effect of great quantity and small quality is far-reaching distress. Let us think of the worker of the future. He deserves some thought. Visualize the labor that devolves on him as he searches for past knowledge. He cannot tell by a title what to avoid; nor by a name. He must search the literature to be sure of himself. Doing so, he bogs himself in a morass of pointless writing.

There too is the stigma, the reflexive accusation the real worker suffers. Sweeping denunciations are hurled at research and the profession that parents it. He, the scholar, scientist, special investigator, feels himself included. To keep clear, he casts about for another outlet, and dentistry loses because of it.

Explanation is difficult. School men say their overlords have demanded it. "Publish" is the order, "Get into print." But that does not explain all of it. It seems that in research alone, a neophyte can splash his way to publicity in printer's ink. He could scarcely do it in literary journalism. The grand opera stage cannot be reached by the first evidence of a voice. There an apprenticeship must be served. True enough, a flash of genius may make a name famous overnight, but genius is always its own press-agent.

Certainly a beginner should have every encouragement. Every sensible man knows research alone saves schools, business, pro-

fessions from obsolescence. In the school, the man under whom the beginner trains, his overseer, should see that he has it. But accomplishment, not publicity, should be the goal, and it will be if the beginner honestly aspires. Others, not under tutorial eyes but attracted by printed words, those who have only a copying pencil to sell, should stand or fall by merit on the market.

One is tempted to consider the cost. Publishers do it; professional organizations might well do it. Think of the repetitive printing that has been done—printing to please—and the cost of it. Choose any popular subject of the last ten years and make an estimate. Always around the central luminaries are hosts of moths basking in the light and dimming it. The photographers have not for differing reasons dared to remove them from the print. Because a new voice may catch a new ear is scarcely a defense for the extravagance.

We have been told that scholarship is a modest quality; also that its child, research is the same. We are surprised when writings appear that are as modest as a neon sign on a boulevard. With the first paragraph of such, one thinks of the line "It is the cannon's opening roar" with a clerical interpretation to the possessive noun. Men gifted with words, skilful in the jugglery of terms, men of scientific sound but minus the sense, confuse and give research a bad name. They are never terse; they have no point; they leave no residue. They appear to marshall elements to their whim or plan. Molecules respond as to the master's voice. Bacteria deploy to their bugling. Mitochondria appear and disappear at beck or call. Such seem to start with a preconception and, unfailingly, tissues, germs, elements, drugs, line up at the worker's will. It savors of wizardry; but wizardry is not science.

Dental journalism owes a big responsibility to science as a whole; it should be strenuous in its abetment of the work of the scientist. Likewise should it give the substance of the new found pride the profession rightly exhibits by the high plane of the material it presents. That function falls not only to this journal but also to those that wear the professional egis but are sponsored otherwise. It is a simple ethic that if such ask the family name, they should assume the family honor.

N. G. T.

"A CORRECTION OF STATEMENTS REGARDING THE JOURNAL OF DENTAL RESEARCH"

Under the title "A Correction of Statements Regarding the Journal of Dental Research," the late Dr. Martin Dewey, a short time before his death, sent to THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION a letter in which he sought to correct a statement attributed to him before the Board of Trustees of the American Dental Association to the effect that *The Journal of Dental Research* was owned by the First District Dental Society of New York.

To this statement, the editor of *The Journal of Dental Research* objected, and it was to correct any erroneous impression that Dr. Dewey may have given the Trustees that he wished a statement made in THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION. In the course of this statement, Dr. Dewey said *"The Journal of Dental Research* is not owned by the First District Dental Society."

With the discussions that led up to a request for the correction, we have nothing to do. The facts are as here stated.

A FILLER

Possibly some people do not know what a "filler" is. There are different kinds of fillers. Of course, the man who smokes cigars can orate learnedly on the various brands of fillers. Sometimes he knows what is in a filler and sometimes he does not, but every smoker thinks that he knows.

A filler is supposed to occupy a space that would otherwise be unoccupied, or occupied with something less valuable even than the filler.

Nature is said to abhor a vacuum. So also does the editor of a magazine, and thus when the editorial pages just simply will not come out even, there is nothing left for the editor to do but to provide something to fill the vacant space. That is why the editor must improvise something at the last moment to fill a vacuum, and that is why fillers are born.

Obituaries

MARTIN DEWEY, D.D.S., M.D., LL.B.

(1881-1933)

Martin Dewey was born in Wichita, Kans., April 16, 1881; died suddenly, of angina pectoris, at his home in New York City, May 13, 1933, one hour after his return from the state dental meeting at Syracuse.

Dr. Dewey obtained the degree of doctor of dental surgery at Keokuk Dental College in 1902 and of doctor of medicine at Keokuk Medical College in 1904. In 1903, he entered the Angle School of Orthodontia in St. Louis, where he graduated and later taught. His practice was limited to orthodontia and he founded the school of orthodontia which bore his name.

In 1910, Dr. Dewey became professor of orthodontia and anatomy at the Kansas City Dental College, leaving there to teach the same subjects in the Chicago College of Physicians and Surgeons. He later received an appointment as head of the orthodontia department at the University of Iowa Dental School. In 1921, he went to New York to become head of the orthodontia department of the School of Dental and Oral Surgery of Columbia University.

Dr. Dewey was President of the American Dental Association for the year 1931-1932. He was also past president of the First District Dental Society of New York and the Kansas City Dental Society. He was a member of Psi Omega Dental Fraternity and of the New York Athletic and Columbia Yacht clubs. "Practical Orthodontia" and "Comparative Dental Anatomy" are two of the best known dental textbooks written by Dr. Dewey. He was for years an editor of the *International Journal of Orthodontia* and at the time of his death was president of the New York Journal of Dentistry, Inc.

Dr. Dewey is survived by his wife, Muriel De Forrest Dewey, and his mother, Mrs. Emma Wolfe Dewey, of Wichita, Kas.

DAVID MAHLON CATTELL, M.A., D.D.S.

(1852-1933)

David Mahlon Cattell was born in Harrisville, Ohio, June 26, 1852; died, April 28, 1933, in Los Angeles, Calif. He graduated from the University of Michigan College of Dentistry in 1879, thereafter teaching in the Chicago College of Dental Surgery and Northwestern University Dental School for ten years. He was one of the organizers of the Illinois School of Dentistry, which became the dental depart-

MARTIN DEWEY, D.D.S., M.D., LL.B.
(1881-1933)

ment of the University of Illinois, and in which he taught operative dentistry until 1903.

From this position, he went to a similar one in Vanderbilt University at Nashville, Tenn., where he taught until 1909, when he was called to Memphis to assist in the development of a dental department in the state university. After ten years in this institution, he was called to the Medical Department of the University of Virginia to assist in the organization of a state dental college. Here, he taught until 1922, when, in search of more pleasant climate, he accepted a position in the dental department of the University of California, where he continued to teach until his retirement.

Dr. Cattell was not only prominent in teaching and organizational work in the dental field, but was also a writer and the recipient of many honors in the way of high offices in the dental societies of the various states of which he was at different times a resident. He wrote not only on his specialty, operative dentistry and operative technics, but also, in later years, on the history of his subject as taught in the dental schools. He also wrote many biographical sketches of leading dentists of his acquaintance.

The widow, formerly Anna Maude Birch, of Chicago, one daughter and one son survive.

JAMES CHACE

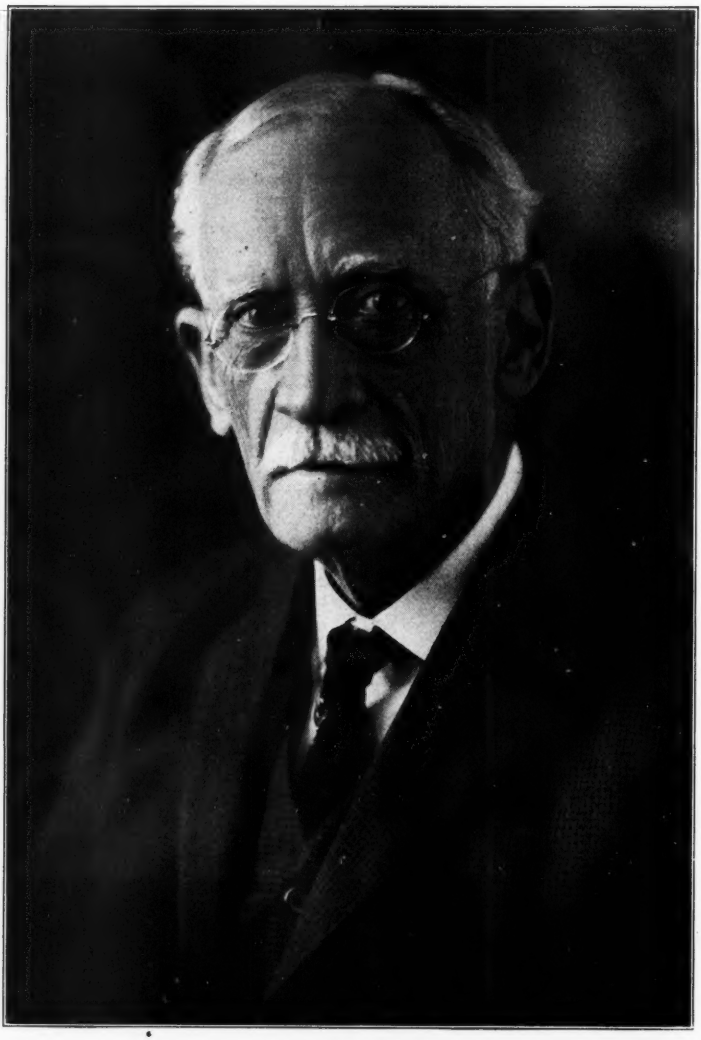
(1848-1933)

"Some men never seem to grow old. Always active in thought, always ready to adopt new ideas, they are never chargeable with fogyism. Satisfied, yet ever dissatisfied, settled, yet ever unsettled, they always enjoy the best of what is, and are the first to find the best of what will be."

When I first had the pleasure of meeting Dr. James Chace, in 1912, at Atlantic Beach, where the Florida State Dental Society was holding its annual meeting, he appeared to be full of years and youth. I have since found that I mistook years for youth—it was all youth, for I have found that those years which he had accumulated were to be dissolved in the forewinds, yet to return to become a compass for the infant mariner on the sea of dentistry.

He was always most sought after on account of his genial personality, his wisdom, and keen alert sense of humor.

Dr. Chace was the first president and the prime factor in the organization of the Florida State Dental Society in 1883 at Jacksonville, in the city library, which was located on Laura street between Forsyth and Bay Street. It is estimated that there were 150 dentists in the state at that time and that thirty-five were present at the organization meeting, three or four of these from Georgia. Georgia had an association which at that time was several years old and these men came down to assist Dr. Chace in organizing the Florida dentists. Dr. Chace with twelve other dentists signed the call to form the Florida State Dental Society. It was decided that eight would make a quorum. On several occasions, a quorum not being present, business was transacted as usual. Dr. Chace was the first recipient of the degree of Good Fellow given by the state organization, it being the only one conferred at this meeting. Dr. Chace and Dr. William McL. Dancy, who passed away several months ago, were the



JAMES CHACE
(1848-1933)

last two past presidents to serve as president of the Florida State Dental Society, between 1883 and 1900.

Dr. Chace invented the gasoline blow pipe which was used extensively for many years and is still used in the rural districts. Without having seen a demonstration, he, after reading an unillustrated article in the *Dental Comos,* which was by the way the only dental magazine published in the United States at that time, began, in 1882, constructing bridgework.

Dr. Chace was born at Monticello, Fla., in 1848. In 1867, he began the study of dentistry in the place of his birth, his preceptor being Dr. Shackleford. In 1869, he began the practice of dentistry in an office of his own. In 1870 he moved to Cedar Keys, and in 1874 to Key West.

After two and a half years in that city, he went to the Bahama Islands, where he practiced eight months. He then returned to Key West, but on account of the yellow fever decided to locate in Cedar Keys, moving in 1888 to Ocala, where he practiced ten years. He came to Jacksonville in 1898, practicing in this city until November, 1925. Only then did he relinquish a fine practice, on account of dimming sight.

I have never seen a man take his years more beautifully or gracefully. To the end, he was immaculate both in his person and his attire. His mind was most alert, his conversation interesting and his reasoning most sound.

All who knew Dr. Chace loved and honored him. He was a fine and noble character and his passing will be deeply mourned by the dental profession.

"Childhood itself is scarcely more lovely than a cheerful, kindly, sunshiny old age."

Dr. Chace died at his home in Jacksonville, April 2, 1933, at the age of 84. He is survived by his widow, Mrs. Lulu D. H. Chace, and four children, Mrs. Joseph Hoover, Starke, Fla.; Mrs. Roy Bence, Cambridge, Mass.; Dr. Henry Chace, Jacksonville Fla. and Dr. J. E. Chace, Ocala, Fla.

LYNWOOD EVANS

FRANK HAMLIN ZINN, D.D.S.

(1860-1933)

Frank Hamlin Zinn was born in Goshen, Ind., April 30, 1860; died at Canton, Ohio, April 25, 1933. He was educated in the public schools of Goshen and later attended Hillsdale College in Michigan. He was graduated from the Chicago College of Dental Surgery in 1887.

Dr. Zinn was a member of the Chicago Dental Society, Illinois State Dental Society, American Dental Association and the Odontographic Society of Chicago. He was a past president of the Chicago Dental Society and had also served as its secretary. He was a member of Delta Sigma Delta Fraternity, of which he was Grand Master in 1900-1901.

The widow, formerly Helen Kendrick, of Florence, Ala., survives, together with one son, Earle K. Zinn.

GEORGE N. WEST

OWEN LOVEJOY HERTIG, A.M., D.D.S.

(1866-1933)

Owen L. Hertig, one of the most widely known and respected members of the Odontological Society of Western Pennsylvania, died March 1, 1933, at his home in Pittsburgh, after an illness which began in the summer of 1932 and grew rapidly worse during the last few weeks prior to his demise.

Dr. Hertig was born in Waynesburg, Pa., sixty-seven years ago. His father was one of the earliest dental practitioners in that section of the state. A brother, Horace Hertig, was also a dentist and succeeded to their father's practice in Waynesburg. Dr. Owen L. Hertig will be recalled by all who have seen him give operative clinics as endowed with unusual skill as an operator. He was a graduate of the Waynesburg High School. He received his master of arts degree at Waynesburg College, and his D.D.S. at the Pennsylvania College of Dental Surgery, in 1890. In the same year, he entered practice in Pittsburgh.

Dr. Hertig was one of the small group of men who brought about the reorganization of the Odontological Society of Western Pennsylvania, in the spring of 1895. Since that time, he had been in continuous membership, a regular attendant at the meetings and a frequent contributor to the professional and clinical programs. He was a member of the Pennsylvania State Dental Society and the American Dental Association, and frequently appeared on the programs of those organizations, as well as many others in Western Pennsylvania, Ohio and West Virginia. He was a man of the highest ethical standards and ideals, always willing to contribute to the advancement of his profession or the assistance of his confrères. His outstanding ability as a writer, speaker and clinician, and his friendly, generous nature, caused him to be in great demand by dental and other organizations for such work. He was a frequent contributor to dental literature and his writings will be found over a period of forty years.

In 1896, when the Dental School of the University of Pittsburgh was organized, Dr. Hertig became a member of the first faculty. He had been in active service continuously since that time, as professor of dental pathology and a special operative clinician. In addition to his lectures, he gave special clinics in all phases of advanced operative work to the students in small groups, followed by seminars in operative dentistry. He was probably the first man to institute and carry on extensively this type of individual instruction to the students.

Dr. Hertig was an expert marksman with rifle and revolver, and deeply interested in archery. While an earnest teacher, he was as boyish at heart as any member of his classes and because of this ability to get close to the student, was one of the best loved teachers in the university.

He had a talent for music and when weary from his various labors, a half hour with his guitar or violin, preferably in company with a kindred spirit, was all that seemed necessary to restore him to his customary cheerful outlook on life.

The widow, formerly Sara Ellen Neff, survives.

H. E. FRIESELL

OWEN LOVEJOY HERTIG, A.M., D.D.S.
(1866-1933)

BUREAU OF PUBLIC RELATIONS

THE NEW JERSEY STATE PLAN

By J. M. WISAN,* D.D.S., Elizabeth, N. J.

WHILE the University of Pittsburgh was in the process of construction, the architect strolled among the workers busily engaged in their individual tasks. He approached a stone cutter and asked him,

"What are you doing?"

"Don't you see that I am chipping stone?" was the response abruptly given.

Amused by this explanation, the architect determined to learn how other workers would reply to the same question. So he walked up to another stone cutter and inquired of him,

"Well, my good man, what are you doing?"

"I am making $5 a day," was the answer.

He spoke to a third stone cutter and received the reply, "I am helping to build a university." The third stone cutter had a definite purpose.

The Council on Mouth Hygiene of the New Jersey State Dental Society has gradually evolved and formulated the New Jersey State Plan of Dental Health Education and Service Promotion. To improve the dental health of the community has been the goal. Every step prepared, every plan attempted, was carried on with that one supreme purpose.

Three years ago, when the present program was begun, the state dental society was paying little attention to the subject of dental health programs, and the component societies were making only spasmodic attempts to meet the needs of the community.

In 1931, the Council on Mouth Hygiene and Public Instruction, a committee that is empowered by the by-laws of the state dental society "to devise and promote such methods as will serve to educate the general public throughout the state in oral hygiene and a more intelligent care of the teeth," determined to make a survey of oral hygiene activities in New Jersey and other states.

As a result of this study, which was conducted, October, 1930-April, 1931, the Council on Mouth Hygiene had a fairly comprehensive idea of the needs and the possibilities of mouth health campaigns in New Jersey.

The first step was the reorganization of the committee. E. J. H. Schneider was made director of component society activities; F. G. Houghton, director of dental health education; P. R. Hulse, director of the Southern Council on Mouth Hygiene; F. K. Symanski, secretary and treasurer, and I, chairman of the council.

The second move was the appointment of an advisory committee consisting of men and women representing many phases of dental health activities.

Then the indispensable subject of funds

*Chairman, Council on Mouth Hygiene and Public Instruction, New Jersey State Dental Society.

was considered. From year to year, the state society had had a definite budget, which made no allowance for educational activities. Since the state society would not and could not donate sufficient funds, it was necessary to appeal to the component societies. With the assistance of the president, Dr. Pruden; the president-elect, Dr. Roberts; and the vice-president, Dr. Mulholland, who made official visits to all the local societies, a fund of nearly $1,000 was raised. The state society contributed $400, which gave us a total of about $1,400 to carry out the program.

With these funds, we were able to obtain: A mimeograph outfit; typewriter; 16 millimeter movie projector; seven movie films: "The Care of the Teeth" (two), "How Teeth Grow" (two), "Grandfather Molar" (two), "Ask Your Dentist" (one); lantern slides; files, scrap books and literature dealing with mouth health; miscellaneous supplies, and services of a part-time typist.

Thus equipped, the Council on Mouth Hygiene was ready to proceed with formulated plans of action. With the definite aim to improve the dental health of the community, a program was instituted to disseminate dental health information and to promote the establishment of dental clinics for indigents. It was realized that if the dental health of the people were to be improved, education and service promotion should be taken in consideration.

The educational phases of the plan included: publication of articles in newspapers and dental health leaflets, talks by dentists, a statewide poster contest, cooperation with school officials, component dental societies, health organizations and commercial organizations and the supplying of dental health data to individuals.

Efforts to provide dental service for indigents were carried out as follows: 1. A survey was made of facilities available for adult indigents. 2. Component societies were urged to become interested in the dental needs of indigent adults. 2. A survey was made of facilities available for indigent children. 4. Cooperation was sought with communities in establishing clinics for indigent pupils. 5. The state department of public instruction was collaborated with in the publication of a bulletin "School Dental Service."

How the various phases of the plan were conducted is described in the following summary:

EDUCATIONAL PHASES

Newspaper Articles. — Experienced workers believe that articles published under the name of a committee are unacceptable to editors. They are considered propaganda by readers and therefore fail in their purpose of disseminating dental health information. Two types of newspaper work seemed to be most effective in the dental health program; namely, releases from public health agencies and articles written by a dentist holding an authoritative professional position in dental health work.

The Milk Research Council, a health educational organization supported by the milk industry, aided in the publication of articles dealing with all phases of dental health. The basis of cooperation was discussed by the board of trustees of the dental society, and accepted with the proviso that the articles be censored by the publication committee. The further precaution was taken to refrain from publishing articles in the locality in which the author practiced.

It was feared that such articles might be criticized as unethical because they were published under a dentist's name. The privilege of writing such articles might be abused to be sure, but this can be avoided by having the articles censored by a responsible committee.

In all, forty-nine articles have been published since June 1, 1932, and as yet no objections have been offered before the state dental society. The number of newspapers using them has increased from 69 to 170, and the comments coming in from laymen and dentists have been favorable. The technic of preparing and submitting these articles was supervised by trained newspapermen on the staff of a trade education organization. Ten or twelve articles were written at one time, an attempt being made to make the titles fit in with the date of publication. The list of titles and dates given below illustrate this point. The articles were then corrected and edited by experienced newspaper men and finally censored by the publication committee of the state dental society.

In final form, the articles were printed on a release sheet, each article having a release date and sent out to all the papers in the state with a self addressed postal for the editor to indicate whether he would use them. Editors were offered mats, and most newspapers used mats.

The articles listed for the months of January-May, 1933, were as follows: "The Year's Advances," "Helping Yourself to Good Teeth," "Dental Disease Among Children," "How and When Teeth Erupt," "Types of Fillings," "George Washington's False Teeth," "Everyone Can Have Good Teeth," "'Saving Space' for Permanent Teeth," "The Importance of School Clinics," "Tooth Pastes and Mouth Washes," "Faulty Economizing in Foods Is Not Economy," "Economy Diet That Will Protect Teeth," "April Fools' Day Is Gone but Many of Us Are Still Being Fooled," "Easter Eggs and Children's Teeth," "Solving Behavior Problems with Dental Treatment," "Child Health Day," "Ten Rules for the Care of the Teeth," "How Tooth Infection Destroys Health," "For Every Child a Tooth?" "The Importance of School Dental Clinics."

Would I recommend this method to other state societies? Yes. If the articles are written and presented by officers of state dental societies or chairmen of oral hygiene committees, they will do yeoman's service in disseminating information concerning dental health.

Dental Health Leaflets.—Four leaflets were printed and distributed. Two ("If You Want Good Teeth" and "Help Yourself to Good Teeth") were general in character. "Give Him Good Teeth" described the eruption of teeth; "Taking No Chances with Trench Mouth" dealt with Vincent's infection. More than 1,200,000 of these leaflets were distributed.

The distribution was carried on in this way: A letter was sent to every member of the state society enclosing a few copies of the leaflets, and advising them that the leaflets could be distributed in the following ways: presented to patients, mailed with statements, mailed with prophylactic notices, mailed with service club letters and distributed at parent-teacher meetings, through schools, etc.

A return postcard was included, making it possible for the members to obtain as many copies of the leaflet as they desired without any expense.

The latest leaflet prepared, "Give Him Good Teeth," was offered to school officials after it was approved by the Department of Physical and Health Education of the New Jersey State Department of Public Instruction.

Talks by Dentists.—No effort was made to induce organizations to invite dentists to speak on dental health. Requesting permission to speak before various groups does not, in our opinion, increase the prestige of the dental pro-

fession, nor does it add to the reputation of the dental program. We considered it more dignified to await invitations and then supply capable speakers.

Films and slides were purchased to assist our members in giving these talks. Reprints of suitable dental health talks were obtained and distributed on request. The use of this material was offered to members without any cost to them.

The council demonstrated that dentists who were cooperating in this work were performing a service in the interests of the profession and the public. Too frequently have dentists frowned on activities of this type as "publicity stunts." The dentist in private practice should be encouraged to widen his interests and participate in public dental health programs.

Radio broadcasting was not attempted for two reasons: The more popular stations could not donate time for this purpose, and it was difficult to enlist dentists trained in speaking before the microphone.

Statewide Poster Contest.—Under the direction of Frank P. Houghton, director of dental health education, a statewide poster contest was conducted in the schools. Fifty dollars in prizes were offered to the students presenting the best posters (the winners had not been chosen when this article went to press).

Many health educators deny the value of such contests. They may be correct in contending that the majority of pupils do not derive sufficient benefit from such efforts; nevertheless, it seems to me that posters, of effective colors and contents, placed in advantageous positions, will draw much attention to the dental health problem.

It may be stated that research in health education procedure is required before we can arrive at definite conclusions in this matter.

Cooperation with School Officials.—School officials can be divided into three classes: (1) those interested in dental health education, (2) those interested in dental health but not being sure as to the best means of conducting the dental program and (3) those not interested in the subject. It was apparent that each of these groups required separate treatment. It was necessary, therefore, to investigate the attitude of each school superintendent before approaching him on the subject of dental health programs. The importance of working with such information cannot be stressed too emphatically.

From the first group (interested and informed), it was found that we could obtain much information and assistance. They were willing to carry on experimental work to ascertain effective means of presenting dental health material to pupils. For instance, one supervisor conducted a recall test, to learn the value of movie films in dental health education. In other words, members of this group would assume the leadership in conducting dental health programs, using the dental organization in an advisory capacity (where they belong in the health education program). Our approach to these men consisted of a personal interview and an offer to help in any way that they deemed advisable. Usually, they suggested means of cooperation.

We were fortunate in obtaining the help of A. G. Ireland, director of physical and health education of the state department of public instruction. Without doubt, Dr. Ireland is one of the few public health authorities who is vitally interested in the dental problem. The school officials who were interested in dental health but had not had an opportunity to study this phase of the school program made up the greatest number.

For this group we arranged joint meet

ings conducted by the component dental society and the school authorities. The program arranged by the Union County Dental Society and the Union County Department of Public Instruction is illustrative of this purpose. A symposium on dental health education was presented, the following phases being discussed: "What Should Be Taught in the Dental Health Program?" Thaddeus P. Hyatt, professor of preventive dentistry, New York University; "How Dental Health Information Should Be Presented to Pupils," Pauline Brooks Williamson, B.S., chief, School Health Bureau, Metropolitan Insurance Company, and "Who Should Teach Dental Health in Public Schools," Allen G. Ireland, director of physical and health education, New Jersey Department of Public Instruction.

This meeting proved to be a most effective means of disseminating authoritative information regarding the school mouth health program. Reprints of the talks were made and distributed throughout the state.

The school officials not interested in promoting dental health constitute one of the serious problems confronting dental health workers. Before they can be aroused to action, they must be convinced that neglecting children's teeth impairs the general health. In dealing with the officials we used indirect channels, offering them movie films and other dental health education material. To measure the success that we have had with these men is impossible. We believe that, in many school districts, more attention has been paid to the dental problem because of our efforts. An organized and unceasing campaign should be waged against the indifference of school men who are not cognizant of the value of dental health.

Component Societies.—The success of the state program was due to the interest and cooperation of the component societies. As mentioned above, almost $1,000 was contributed by them to buy the equipment so vitally necessary in disseminating dental health information.

For this method of obtaining support from the local societies, I am indebted to the Greater New York Oral Hygiene Committee. It was my pleasure to attend their meetings and thus acquire much information from men who were pioneers in mouth hygiene activities. In recommending this policy to other state societies, I can cite two arguments in its favor: 1. The materials which individual organizations cannot afford to purchase can be obtained by the cooperative action of all the local societies in a state society. Of course, the large city organizations, with their resources, can set up intensive programs. 2. The fact that the component societies contribute to the fund increases the chances of their using the materials more freely and interesting themselves in the state program.

Perhaps the most effective plan adopted for the benefit of the component societies was the promotion of joint meetings as described under "Cooperation with School Officials." In connection with this part of the program, it was evident that the state dental society should assume the leadership in dental health projects. A state council, effectively organized, has more prestige and control than separate unorganized committees distributed all over the state. E. J. H. Schneider was in charge of this phase of our work.

Health Organizations.—Every health organization has a definite plan and viewpoint. If the state dental society is to cooperate with them, a study must be made of the activities of each organization, to determine how collaboration of efforts can be realized and how overlapping may be avoided.

First of all, we found it necessary to prove to them that we were interested in public health. When this fact was impressed on their minds, it was much easier to persuade them to cooperate with us.

The New Jersey Tuberculosis League permitted us to use their publication, "The Beanstalk," in presenting dental health information. Since this magazine was distributed to school teachers throughout the state, our material eventually reached a great number of pupils. The New Jersey Department of Health printed articles on dental health in their publication and, at the suggestion of the council, distributed the following questionnaire to 500 dentists and physicians. This was done to ascertain the need of official action in curbing Vincent's infection. Results have not been compiled at the present writing.

1. How many cases of Vincent's disease (trench mouth) have come to your professional attention during the last year? .....
2. To your knowledge, how many of these cases were also treated by physicians? .....
3. In how many of the cases which came to your attention did you attempt to confirm diagnosis by laboratory tests? .....No. reports positive?.....No. reports negative?.....
4. How many cases were in children below 15 years of age?.....
5. In how many instances did more than one case occur in the same family? .....
6. Based upon your experience, do you feel this disease has increased in prevalence during recent years in your vicinity? .....

Signed.....

Cooperation with Commercial Organizations.—It is to be regretted that dental societies often have insufficient funds to carry on educational projects. Budgets arranged according to past policies are difficult to alter. Convention expenses, the expense of sending delegates and clinicians to national meetings and other essentials must be met. New work is always hard to launch.

Dental societies have been rightfully reluctant to work with commercial organizations in promulgating dental health projects because of the fear that their program would be commercialized. If the literature thus secured is sound and free from advertising, I believe in harnessing the great force of commercial organizations to the campaign for oral hygiene. Mutual benefits will undoubtedly accrue if societies will cooperate with reputable organizations prepared to work along these lines.

We have cooperated with two organizations: the California Fruit Growers Association and the Milk Research Council.

In working with the California Fruit Growers Association, we allowed them to use our name on a poster of this type:

THIS IS
CHILD HEALTH WEEK
PROTECT YOUR TEETH
BY EATING PROPER FOODS { ORANGES AND LEMONS / MILK / VEGETABLES }
BY CLEANING TEETH REGULARLY
AND
VISITING DENTIST REGULARLY
Council on Mouth Hygiene, N. J. State Dental Society

Obviously oranges and lemons receive more mention than they deserve; but since they provide vitamin C, they help to protect the teeth. It should also be recognized that since other oranges beside "sunkist" are sold in New Jersey, the effort on the part of the California Fruit Growers Association is not wholly a selfish one.

Our cooperation with the Milk Research Council was wider in scope. We have worked constantly with it during the past year. Newspaper articles covering all phases of dental health were published with their assistance. Leaflets prepared by the council were printed and distributed by them as explained above. The committee was given the widest latitude in this

work. We were not expected to place undue emphasis on milk. The relationship proved to be workable and productive. It is not an exaggeration to say that much of the success of our program is due to the liberality of the Milk Research Council in supporting our work. The funds available would have been insufficient to carry out an extensive program without its assistance.

One reason the Milk Research Council is so acceptable to us is that its executive staff consists of trained public health workers rather than trade promotion workers.

Clearing House for Dental House Data.—We attempted to gather all available publications, books, bulletins, magazines, leaflets and other material dealing with oral hygiene. Through having this information in a location convenient and available to the members of the New Jersey State Dental Society, impetus was given to the dental program.

In many cases, not only dentists wrote for information, but also lay persons. The Council supplied this information without cost to those making the request. Reprints of dental health talks were in great demand. Many of these were obtained through the Bureau of Public Relations of the American Dental Association.

Reports of dental progress, statistics dealing with dental conditions, data of clinics and a list of advantages of school dental programs or of methods of arranging school dental programs and material for teachers were requested most frequently.

This activity proved profitable to individuals interested in dental programs and indicated to the committee what material was required.

PROVIDING DENTAL SERVICE FOR INDIGENTS

An educational program that did not give consideration to the dental needs of indigents would fall short of the aim—improving the dental health of the community. In other words, the Council on Mouth Hygiene assumed that its chief responsibility lay in furthering the interests of the public, and that such a policy would benefit the dental profession by increasing its prestige in the health field. A state dental society composed of local component societies cannot dictate a general policy to be followed in setting up dental clinics throughout the state. Such action must come from the individual organizations. Hence, the plan pursued was to inform the public and the members of the dental profession of the need, leaving it to the component societies and the local health agencies to provide the necessary facilities.

Survey of Dental Facilities Available for Adult Indigents.—The survey was made from two vantage points: component societies and hospitals.

1. Component societies. Questionnaire A:
1. Are dental services provided for indigent adults within the jurisdiction of your component society?

Yes .....
No .....

2. Where are these services provided?

A REPORT OF COMPONENT SOCIETIES, MARCH, 1933

Copies of "Questionnaire A" were sent to representatives of the component societies on the New Jersey State Dental Society with the following results:

Question 1. No. component societies reporting dental service for indigent adults within their jurisdiction, 9.

No. component societies reporting no dental service for indigent adults within their jurisdiction, 4.

Remarks: 2 societies report service "only as individuals—no connection with society." 1 society reports services "for emergency relief." 1 society reports services "to a limited degree."

Question 2. Distribution of Dental Work: hospitals, 6; hospital oral surgery clinics, 2;

dental offices, 2; offices, dispensary and hospitals, 1.

Remarks: Dividing work among offices, dispensary and hospitals is found to be "a very poor arrangement."

Freehold reports that the dentists along the shore have done nothing, but nine townships in the interior are being taken care of in the dental offices through the cooperation of Monmouth County organization for social service.

Paterson reports: "During the present depression, adults are being cared for. All those who are on the mayor's committee list receiving food, etc., from the city report their tooth troubles at the Paterson Health Center. They are checked on the list of the above committee and, if found worthy, are referred to E. H. Cort, who is in charge of the Passaic County Dental Society Relief Committee. He then sends them to one of us according to our position on the list and the work is done free in our own offices. The dentist furnishes everything, the city bearing no part of the expense. There are no clinics."

A group of dentists have been taking care of indigent children in Ventnor City (Atlantic County).

Facilities in Hospitals.—(To gather more definite information regarding dental facilities for adult indigents, Questionnaire B was sent to the superintendents of all hospitals in the state to find out which hospitals were providing dental services. The superintendents were also requested to state their opinion regarding the advisability of providing nonsurgical treatment for school children in hospitals.)

Questionnaire B: 1. Does your hospital provide dental services for indigent adults?

Yes .....
No .....

2. Do you think that nonsurgical dental treatment (by nonsurgical treatment is meant routine or simple extractions, fillings, treatments, prophylaxis) for indigent school children should be provided in hospitals?

Yes .....
No .....

In school dental clinics?

Yes .....
No .....

Reasons:

REPORT ON QUESTIONNAIRES SENT TO HOSPITALS, MARCH, 1933

Questionnaire B was sent to the superintendents of fifty-seven hospitals in the State of New Jersey with the following results: No. of questionnaires answered, 43. No. of questionnaires unanswered, 14.

Provision of dental services for indigent adults was as follows: number of hospitals providing service, 31; number of hospitals not providing service, 11; number of questions not answered, 1.

The type of dental work done in hospitals is given in the accompanying table.

Opinions of superintendents as to where nonsurgical treatment should be given to school children were as follows:

In the hospitals, 8.

In the school dental clinics, 22

In hospitals and school dental clinics, 7.

Place to be decided by department of education, 1.

Place to be decided by dental profession, 1.

No opinion expressed, 4.

Remarks: Atlantic City reports that most schools maintain dental clinics.

Bridgeton reports that their high school has already established a very fine clinic.

Arguments offered in favor of having treatment carried out in hospitals were as follows:

1. Having work done in school dental clinics may lead to abuse by providing care for children who are not indigent.

2. This work should be done in the outpatient department of the hospital, thereby giving the dentist and interne a more complete knowledge of this department of surgery.

3. This work should be a part of the outpatient department of the hospital because there are so many allied conditions which the clinic is prepared to care for and which it may be discovered there is need of at the time dental care is being provided.

4. This work should be done in the hospital because in case of hemorrhage facilities are at hand.

5. Three superintendents believe that the work should be done in the hospital if paid for by the town or board of education (not if free care is expected).

6. With reference to indigent school children, Somerset Hospital reports: "We consider this one of our most interesting services, partly paid for by the board of education, supplemented by Somerset County Welfare Foundation." The same hospital reports that the

TYPE OF DENTAL WORK DONE IN HOSPITALS

County	Hospital	Type of Dental Work Done
Atlantic	Atlantic City Hospital	Extractions for all clinic cases
Bergen	Jersey City	
	Christ Hospital	Not classified
	St. Francis Hospital	Not classified
	Teaneck	
	Holy Name Hospital	Oral surgery
Burlington	Mt. Holly	
	Burlington County Hospital	Extractions only
Cumberland	Bridgeton Hospital	Dental surgeon takes care of all emergencies and extractions
Essex	Montclair	
	Montclair Community	Not classified
	Mountainside Hospital	For emergency work—no fillings or bridgework
	Newark	
	Beth Israel Hospital	All types
	Newark City Hospital	Emergency cases that are admitted to hospital
	St. Barnabas Hospital	A limited amount
	Orange	
	Orange Memorial Hospital	Extractions
Hudson	Secaucus	
	Hudson County Hospital	Extractions only
	Weehawken	
	North Hudson Hospital	Not classified
Mercer	Trenton	
	Mercer Hospital	Not classified
	Orthopaedic Hospital	Dentists have volunteered to come in and perform extractions whenever indicated but no other type of work
Middlesex	Perth Amboy General	For inmates only
Monmouth	Long Branch	
	Monmouth Memorial Hospital	Not classified
	Red Bank	
	Riverview Hospital	Not classified
Morris	Morristown Memorial Hospital	Extractions only
	Lakewood	
	Paul Kimball Hospital	Doctor requested to come into hospital
Passaic	Passaic	
	Passaic General Hospital	Not classified
	St. Mary's Hospital	Not classified
	Paterson	
	Barnert Memorial Hospital	Limited to extractions and surgical conditions of the oral cavity
	Paterson General Hospital	For patients when dental consultation is desired by physician in attendance
	St. Joseph's Hospital	Staff of two dental surgeons who have a service of six months each on the wards, but no dental clinic
Somerset	Somerville	
	Somerset Hospital	Not classified
Union	Elizabeth	
	Alexian Bros. Hospital	Not classified
	Elizabeth General Hospital	Hospital, surgical work Dispensary, extractions and fillings
	Plainfield	
	Muhlenberg Hospital	Not classified
	Summit	
	Overlook Hospital	Not classified

facilities of the hospital are used, i. e., roentgen-rays as needed. The house physician makes a physical examination before extraction and gas anesthesia as advised. The clinic is open sixteen hours a week and on an average cares for 100 children a week.

Arguments offered in favor of having treatment carried out in school dental clinics were as follows:

1. This work should be taken care of by school dental clinics because hospitals do not have the facilities for such a large volume of dental work and few hospitals are in a position to undertake it.
2. Hospitals are often far removed from schools, and therefore time is lost.
3. This work should be done by school dental clinics if properly run, but not if the hospital can do it better and is reimbursed at cost. Under present financial conditions, patients must pay or have someone pay for them at cost or the hospitals must close. There is no alternative.

Providing Dental Treatment for Adult Indigents.—No organized campaign was conducted to urge the local societies to provide dental clinics for adult indigents. As stated above, we held the theory that such matters could best be handled by local organizations.

It was hoped that the questionnaire, besides obtaining information, would arouse interest in this subject. We expect an increase of facilities for indigents in the near future.

We did suggest that one of our larger component societies adopt the voluntary system—sending indigents to the dental offices for treatment. This attempt met with failure.

Survey of Facilities Available for Indigent Children.—The report on school dental clinics was as follows:

REPORT ON SCHOOL DENTAL CLINICS, DECEMBER, 1932

There were three objectives in this study: (1) to ascertain the number of school districts providing dental services for school children; (2) to study the procedure followed in school clinics, and (3) to make recommendations toward the standardization of school dental clinic procedure and records.

Questionnaires were sent to city and county school superintendents of New Jersey.

One form was sent to county superintendents, to obtain general information concerning the clinics within their jurisdiction. Another form was sent to city superintendents that more definite information might be obtained regarding the clinics operating in the cities.

FINDINGS

Number of Clinics.—Of the total number of 537 school districts, dental service was provided as follows: by school clinics, 100 districts; by hospital clinics, five districts; by private dentists, five districts. In other words, 110 school districts, or 20 per cent of the total number, provided some form of dental treatment.

Dental inspection was carried on by: a dentist, 102 districts; by a physician or nurse, 341 districts. There was no dental inspection in 94 districts.

Number of Clinics Discontinued or Established.—Seven districts reported that the clinic had been discontinued because of lack of funds. One contemplated discontinuing the clinic, while one district was preparing to establish a clinic.

Supervision.—In the 110 districts providing dental treatment, the work was done under supervision of the board of education in 104 districts; under this board and the board of health, in two districts; under the aldermen, in two districts; under the board of health, in two districts (one of these districts having inspection under the board of education).

Where services were performed in hospitals and private offices, it was carried on by the P. T. A. in collaboration with local dentists. The Red Cross was inter-

ested in one hospital clinic and one school clinic. One clinic in Newark is conducted by the hospital (Beth Israel Hospital) where all forms of dentistry are practiced for indigents at nominal fees.

The Hudson County Dental Society appointed committees to assist the school authorities in obtaining dental treatment for children unable to receive treatment in the school clinics. The depression had increased the number of indigents to such an extent that the school clinics could reach but a small proportion of the necessitous pupils.

Eligibility for dental treatment in clinics was as follows: all pupils, six cities; indigent pupils only, twenty cities; all below high school, one city; all "worthy cases," one city; first, second and third grades, one city; 350 selected cases (out of school population of 6,800), one city; pupils up to 10 years and not over third grade, one city; all pupils in public and parochial schools, one city.

The situation as to fees was as follows: fees charged, seven cities; fees charged, but only to those who could afford to pay (it seems likely that this procedure is followed in other cities also), three cities; no fees charged, twenty-two cities.

REPORTS

The reports of school dental clinics as presented by most communities were of little value for a comparison of results. There was no unformity either in data supplied or in method of obtaining data. A few of the significant reports follow:

In Union County, Dr. A. L. Johnson, superintendent of schools, with the assistance of the county supervisor of dental clinics, set up definite forms by which the school dentists were expected to make monthly reports. This plan has proved profitable. When the results accomplished were compared with the amount spent on the clinics, it was easily seen what communities were not obtaining the maximum results.

Dr. Dyke, superintendent of the Milburn Schools, had interesting figures indicating such items as average time required for each treatment, average cost of each treatment and average cost per child treated over a period of ten years.

The school districts that offered data concerning the cost per operation showed a wide variation. One school district showed the cost for the average operation as 69 cents; another $1.69, and still another showed a cost of $4.18 per operation. Since the cost per operation is obtained by dividing the total cost of maintaining the clinic by the total number of operations, the result is a fairly definite index of the efficiency of the clinic.

SUMMARY AND CONCLUSIONS OF SCHOOL CLINIC SURVEY

1. If the incidence of dental decay is to be reduced and if dental disease is to be prevented, the schools must make an intensive effort with a view to making the dental service program a preventive and an educational project rather than one of treatment.

2. Facilities to provide dental services for indigent children are totally inadequate.

3. A vast majority of the school dental clinics in this state suffer from the lack of professional supervision. Every school dental clinic should have both administrative and professional supervision (by a dentist not operating in the clinic).

4. Considering the financial conditions of the past two years, it is commendable that there were more school dental clinics operating in 1932 than in 1929.

5. Reports coming from the school clinics are valueless for purposes of comparison. School dental clinics would be improved if they were all under the supervision of the boards of education, and all

clinic reports sent to the department of physical and health instruction. In this way, results could be compared annually and communities helped to obtain the maximum benefits from the clinic.

It is suggested that every school district having a dental clinic send in an annual report to A. G. Ireland, using two forms:

A. Describing the number and type of operations and other details of clinical operation.

B. Describing the clinic finances—income and expenditures.

Cooperation with Communities in Establishing Dental Clinics for Children.—Data compiled from these surveys were invaluable in helping communities that planned to establish school dental clinics. The council obtained information from men throughout the United States concerning the problems and results of school dental programs. Thus fortified, it could assist all officials who were interested in improving the dental health of pupils.

Whenever requested, the council sent representatives to aid in the preparation of dental programs.

"School Dental Service."—The survey of school dental clinics convinced the members of the council that the procedure in school dental clinics ought to be standardized and that more uniform records should be requested by the state department of public instruction.

With this in mind, the council prepared a fifty-six-page bulletin, "School Dental Service" for the state department of public instruction. This was printed by the commissioner of education (in October, 1932), and distributed to all school dentists and school officials throughout the state.

The bulletin covered the following: the need and value of school dental service; aims and objectives; organization and administration; general principles; technics and procedure in the clinic; equipment, and record forms and reports.

ADVISORY COMMITTEE

Since our activities constituted a public health project, it was necessary to obtain the assistance of a representative advisory committee. This committee was called to a meeting on only one occasion, for the purpose was to communicate with them by mail and obtain in this way their opinion regarding the problems which confronted the council.

To indicate the groups represented by our advisory committee the following list is presented:

Dr. A. G. Ireland, director, physical and health education, New Jersey Department of Public Instruction.

Dr. Julius Levy, chief, New Jersey Child Hygiene Bureau.

Dr. A. L. Johnson, superintendent of schools, Union County, N. J.

Dr. K. C. Pruden, past president, New Jersey State Dental Society.

Dr. R. A. Albray, past president, New Jersey State Dental Society.

Dr. E. C. Stillwell, past president, New Jersey State Dental Society.

Dr. Grace M. Kahrs, physician, New Jersey State Normal School.

Dr. G. T. Palmer, American Child Health Association.

Dr. C. B. Dyke, superintendent of schools, Milburn, N. J.

Miss Vera Brooks, supervisor of health education, state normal school.

Dr. M. E. Townsend, president, state normal school.

Miss Edna Young Bond, director of child health, New Jersey Tuberculosis League.

Mrs. Charles H. Cooley, state president, New Jersey Parent-Teacher Association.

Dr. Guy L. Hilleboe, supervisor, elementary education, Elizabeth.

Dr. Charles V. Craster, health officer, Newark, N. J.

Dr. W. H. Mac Donald, New Jersey Health Department.

FUNDS

As to the cost of our program, in 1931

our expenses were $100; in 1932, $1,342 ($400 received from state society and $942, from component societies); in 1933, expenses will total $500.

SUMMARY

In seeking our goal—to improve the dental health of the community—we tried to avoid the role of "propagandist." Literally, the word "propaganda" has a favorable significance, but usage has given it an unsavory flavor.

The state society should assume the leadership in dental health activities. To paraphrase the expression of Silas Bent: It should be the metronome and the tuning fork. It should set the pace and strike the key for all dental health programs.

THE DENTAL HYGIENE PROGRAM OF THE MAINE STATE BUREAU OF HEALTH

By DOROTHY BRYANT,* D.H., Augusta, Me.

WHEN the division of dental hygiene commenced its activities in June of 1924, there was no predetermined program nor was there much knowledge of the specific needs of the Maine people or as to how effectively those needs were being met.

Following the policy of the bureau, practiced since its inception as the state board of health in 1885, the director and the division's advisors determined that it was this division's place to study, lead, advise and educate, just as the divisions previously created were doing. The State Bureau of Health of Maine has always respected the rights of communities and individuals to achieve their own goals, and has never established itself in control except in the emergency of epidemic communicable disease or in the face of potential public danger.

Realizing that the ideal mouth condition of invulnerability and perfection would scarely become universal during the lives of the present generation, we adopted as our goal, "Better health and more happiness through better mouths, for every person in Maine," which is practically the objective of every other dental health program.

With this objective in mind and our acquired knowledge of what was needed, we divided our program into two sections, educational and executive, both of which we are attempting to carry on simultaneously. For neither do we claim any originality, for we have profited by everyone's experience as far as it is applicable to our circumstances.

For educational activities, we are at present attempting the following:

1. To mail literature to the parents of new born infants. This is done through the cooperation of the division of public health education, which, cooperating with the division of vital statistics, establishes contacts for the reception of our literature, on all sorts of subjects, when sending out a birth certificate to the parents of every

*Director, Division of Dental Hygiene, State Department of Health and Welfare, Bureau of Health.

new-born infant as it becomes registered.

2. To provide literature and information in prenatal cases. We accomplish this to the best of our ability by cooperating with public health and maternity-infancy nurses, both those employed by our own division of child hygiene and those employed by private and other public organizations.

3. To provide literature and information for parents of preschool children. This we do through the cooperation of public health and school nurses; through the director's attendance, for dental examinations, at preschool conferences, summer round-ups, etc.

4. To survey dental conditions. For the past two years little has been done in this respect, since so much was done in this respect during the first six years of the division's existence. Surveys are now confined to those communities which we are attempting to interest in the establishment of programs. As practically every community is interested but is hampered by lack of funds, the need for surveys has lessened for the time being.

5. To educate the school pupils in dental health. We find that this can be done in a broader field if information and inspiration are supplied to the teachers and school nurses rather than if the director's time is expended in the classroom. We attempt to reach all student-teachers in the six normal schools, both those studying during the academic year and those in the summer schools. We attempt to reach the teaching teacher through participation in the events of the state and county teacher associations, their conventions, etc.

6. To educate adults, particularly parents. We find the usual mediums to be the most effective for this feature. We attempt to reach all parent-teacher organizations and as many of the other types of organizations containing parents as is possible; that is, service clubs, mothers' clubs and women's clubs. We also use the radio and the press.

7. To promote interest in children's dentistry. Without the assistance and intense interest of the Maine Dental Society, it is doubtful that our division would ever have existed, and certainly we would never have enjoyed so much progress. At all times, the dentists of Maine, as individuals and as an organization, have given us their unfailing support and have ever graciously received our requests and suggestions. There is a definite interest in children's dentistry among all Maine dentists.

The explanation of our executive activities requires a consideration of Maine from the standpoint of geography and the population. There are 510 organized communities in Maine, with populations ranging from fifty to 70,000 persons. As there are dentists located in only about ninety of these communities, in some localities persons are from 40 to 50 miles, by "wood-roads," from dental service. Because of the small population, there are many more towns in which a part-time program is adequate than there are towns requiring full-time programs. That fact coupled with the Yankee conservatism of Maine people naturally determines what ideas we advance and what reception our advances receive.

For executive activities, we are attempting to promote the following:

1. Full-time dental hygienist service, locally financed, in each community of over 6,000 population. This service is available in three cities at present and there has as yet been no curtailment in this type of service from the current lack of funds.

2. Part-time dental hygienist service, financed locally, for communities of less than 6,000 population. To promote this

part of the program, we maintain a dental hygienist service, with a staff of one. This service is sold to communities or organizations, at a nonprofit-making price, for as long a period of weeks as they can afford, need or wish. Having operated now for four years, the service is filling an important niche in our program. In some communities the parent-teachers association, Red Cross chapter, Kiwanis Club or other service club, finances the project, or it is supported by town appropriation. Bookings and supervision of the service are directly under the control of our division's director.

3. Preventive-reparative clinics in towns of over 6,000 population, locally financed. (By a clinic, we mean one or more dentally equipped operating rooms where at specified, regular times enough dental service to care adequately for the local problem is available.) We now have eleven cities and towns where this type of service is fairly well developed. These clinics operate principally in the indigent school cases from the elementary grades and, in most instances, treat preschool patients as well. Lack of funds has caused only one community to relinquish this type of service during the past two years of our "depression."

4. Preventive-reparative service, in towns of under 6,000 population, financed locally. (By this service, we mean that patients are sent on regular schedule, to a dental office where they are treated as if in a clinic.) While this situation has many drawbacks from an idealistic point of view, it seems to work out rather well in certain of our communities, particularly those in which there is only one dentist, and comparatively few patients. By way of explanation, may I say that all of our education in dental health, in Maine, has stressed the fact that each family should have its own dentist and should assume dental care as its personal responsibility. We therefore look on clincs and services as necessary to care for only the smallest proportion of our population.

5. Adequate dental care in state institutions. For several years, the two state hospitals (insane) have had full-time dental clinics for the inmates. Each other institution has had some dental service, but plans are fast progressing which will provide suitable care in all institutions, particularly the tuberculosis sanatoriums.

6. Service for adults, locally financed. This feature we hope to develop in the few localities where it is needed, through the development of health centers and hospital outpatient departments.

The foregoing is merely a skeleton of our program. Details would require volumes. The outline does indicate how we are meeting the need for dental care and dental health education in Maine. We realize that there are many vacant spaces in our program and also that our program is not comparable with that of any other state because of our differences in situation, population, circumstances and other details.

DENTAL HEALTH IN KENTUCKY

By J. F. OWEN,* D.D.S., Lexington, Ky.

IN outlining Kentucky's plan for promotion of dental health, it is first necessary to point out how the bureau of dental health of the state board of health originated.

Several years ago, the Kentucky State Dental Association, on the recommendation of its then president, created a new committee to be designated the oral hygiene committee. Simultaneously, the state board of health established a bureau of dental health and appointed the chairman of the new committee its director. This marks the start of the organized movement for dental health in Kentucky, the Kentucky State Dental Association and the state board of health jointly and equally contributing the funds for its inauguration and prosecution.

A few years later, in 1928, the Kentucky General Assembly provided for taking over the financial support of the bureau by the state and made a direct and specific appropriation for that purpose. The arrangement of having the chairman of the oral hygiene committee of the Kentucky State Dental Association also serve as director of the bureau of dental health of the state board of health was continued. Thus, the bureau of dental health is, in fact, an agency of the association, cooperating with the state board of health and wholly financed by public funds. The state board, being an official department of the state government, the appropriation is made to the board, which acts as agent for the Association. The dental bureau, of course, operates in conjunction with the other bureaus of the state board of health and is subject to all the legal requirements affecting the board, including that which provides for inspection and examination of funds by state authorities.

In founding the dental health bureau, it was recognized that dental health activities carried on in connection with a state board of health regulated by governmental authority was a new field in Kentucky. That being so, it was necessary to formulate certain general principles to be followed:

1. If we were to operate in conjunction with state health agencies, it was necessary to familiarize ourselves with the programs of such agencies, general as well as dental.

2. There should be active and general cooperation by organized dentistry.

3. All of our activities, as far as possible, should be carried on through existing agencies.

4. Educational material, especially that designed for laymen, should be concise and, as far as practicable, free from technical terminology.

5. Programs should be adjusted to the varying needs of respective communities, as determined by consultation with local health officers and dentists.

6. Solid foundations must be first laid, if the work was to be progressively successful from year to year.

*Director, Bureau of Dental Health, State Board of Health of Kentucky.

7. Some sort of a survey, covering all parts of the state, should be made, with the view to ascertaining our real problems.

The first step, on the taking over of the financing of the bureau by the state, was provision of a new and diversified type of inspection cards. These cards are three in number and of different colors: white, blue and red. The white card, marked A, designates the child having no apparent dental defects, and therefore is tentatively classed as negative. The blue card, marked B, designates the child who has one or more apparent cavities and is also in need of oral prophylaxis. The red card, marked C, designates the child having sufficient disease of the mouth to affect the general health; that is, carrying positive foci of infection.

These cards are 5 by 3½ inches and are easily handled. They have a perforated stub carrying the child's name, address, grade and school. The stub is torn off and retained by the teacher, to be used later for follow-up literature. Under this system, from fifty to 100 children may be inspected per hour. We recommend to inspecting dentists the use of tongue blades instead of mouth mirrors. In this way, strict asepsis is practiced, and it is very simple to classify the children as to their dental defects.

We feel it our duty to inform parents as to whether the child has simple cavities or positive foci of infection. Special emphasis is laid on children of the latter class. Teachers are urged to stress the importance of promptly removing positive foci of infection, while emphasis is also placed on the fact that children having one or more cavities are likely to develop definite foci of infection unless proper dental treatment is promptly rendered.

This type of inspection is producing very gratifying results. During the first year after its inauguration, an aggregate of 50,000 children were examined by the bureau's staff and cooperating dentists in the state. The number has been gradually increasing, 300,000 children having been inspected in 1932. Concrete results are no less noteworthy. In the first survey, embracing 50,000 children representing a cross-section of the state, only 5 per cent were found to be without dental defects. This percentage has been steadily increasing year by year, with the result that of the 300,000 children included in the survey of 1932, more than 15 per cent were found to be free from dental defects. In the first survey, 21 per cent of the children inspected showed positive foci of infection. This percentage has been gradually decreasing year by year, the decrease being almost in direct ratio to the increase in percentage of children needing no dental attention.

There are several factors in this situation. In 1928, the county health administration, even that on a whole-time basis, was only mildly interested in a dental health program. Today, this interest is practically 100 per cent. Moreover, there is a constantly increasing appreciation by the public of the importance of early dental care, coupled with a steadily expanding knowledge among the people of the relation between proper diet and dental health. Again, both the medical and the dental profession are recognizing more and more the importance of preventive dentistry as against corrective dentistry. From the very outstart, this bureau has stressed prevention as better and safer than correction, particularly in the matter of focal infection.

While the need for some sort of a clinical program conducted by the state was recognized from the very beginning, we were more or less reluctant to inaugurate such a program. In fact, our clinical program was started under protest,

and we are still opposed, as a general principle, to clinical activities by the state or to anything else bordering on state dentistry. We have held and still hold that wherever it is possible for local dentists to solve the problem, a free clinic should not be established. In remote sections of the state, where the need for free clinical service was clearly apparent, we were compelled to accept it as a necessity, adjusting our clinical program to meet the varying requirements of the respective communities in which the clinical service was rendered. In this connection, it should be borne in mind that Kentucky is largely rural, with a rich farming section, a poor mountainous area, some industrial centers and several mining communities. In the poorer areas, dentists are very scarce, many communities in these sections being altogether without dental services.

These clinics, in addition to and apart from their concrete effects, have proved of such educational value as to stimulate a steadily growing demand for extension of the Bureau's clinical program. By September, 1932, this demand had reached such proportions that the director, after consultation with health officers, state and local, deemed it advisable to institute a new and broader type of clinical activities. This new program has already produced results far in excess of expectations. It looks to cooperation with the dental bureau by county health departments, local dentists and group organizations, particularly P. T. A. groups. Such cooperation has already been effected in many counties, with results almost incredible.

About three fourths of the population and two thirds of the geographical area of Kentucky are under full-time local health administration. In this area, the county health organizations are, of course, our greatest single asset, in that the health officer and the nurse and their assistants, if any, are in a position to render a measure and character of service of which no other group is capable. Dentists throughout the state are more and more generally and extensively contributing to the success of the movement. Not only are they aiding in educating the public to the importance of dental health, but, in practically every county in the state, they have arranged to furnish free treatment to a large proportion of indigent children. As an illustration, in most of the counties, the local dentists are under agreement to care for at least one indigent child a week, the child being selected by the local health unit where such unit exists.

The value of the "Blue Ribbon Campaign" to the dental health movement is almost incalculable. A mouth free from dental defects being one of the standards of eligibility to this award for health achievement, it is well within the mark to say that no other single influence is contributing so largely to the correction of dental defects in children or to the education of parents to the importance of dental health in the young.

The professional personnel of the bureau at present consists of a director, an educational and contact representative, who was formerly an outstanding dentist in Kentucky, and three dental clinicians.

Operating as it does with public funds from the state treasury, the bureau seeks to give every section of the commonwealth its proper share of the dental relief provided. It is the part of the several counties to determine, each for itself, whether they share in this relief. In no case is the service forced on any political subdivision of the state. It must be applied for in each and every case.

Application for a dental clinic is usually made through the county health officer. Before approval of the application by this bureau, a circular letter is forwarded to every dentist in the county, explaining the contemplated scope and other details of the proposed clinic. If no objections are registered by the local dentists, the county health officer is notified of the place and time at which the clinic will be held. When the bureau's clinician arrives in the county, he finds that the health officer has arranged all details and provided for getting the children to and from the clinic.

Ten of the larger cities in Kentucky have their own clinical programs. Some of these programs are conducted by full-time dentists paid out of the municipal treasuries; others are operated by part-time dentists maintained by local dentists furnishing free service. Establishment of some of these was promoted by this bureau; others were inaugurated by local agencies, encouraged by this bureau; while a few were established without any assistance from us. Only two of the ten are operated without any help from the bureau. The assistance rendered has been dependent in extent and character, on the varying needs of these communities. In some instances, the bureau has had to provide the actual operative equipment; in others, it has simply assisted in promotion and operation. These clinics have all been more or less effective, the extent of the effectiveness reflecting, in each case, the measure of the interest of the association in that particular community.

In Louisville, the city health department, in cooperation with the University of Louisville, is attacking the dental health problem through the medium of the public school system. Approximately, one third of the public health education work done in the city schools is devoted to care of the mouth. A formal curriculum, compiled by the department of health and approved by the School of Dentistry of the University of Louisville, has been in successful use for the past year. Pupils in all grades are manifesting both an increased interest in and an expanding knowledge of matters pertaining to dental health. During the coming year, it is proposed to provide each city school with an adequate supply of a comprehensive treatise on dental health. This will insure uniformity of teaching, furnish an outline course of teaching material for teachers and give pupils a trustworthy, up-to-date text for study.

Probably the most important phase of the bureau's activity has been that the details of which are taken care of by our educational and contact representatives. This representative covers the entire state, making contacts with local dentists, county officials, school officials and civic groups of various kinds. His services have been invaluable in arranging, in the various communities visited, workable dental health programs accommodating themselves to the varying situations to be met. It is through his activities that most of the dental clinics, city and county, have been established, with the resultant rendering of a tremendous amount of urgently needed dental service to the indigent children of the state. Especially valuable is the educational work so done; for education, after all, constitutes the basic foundation upon which must rest progressively successful prosecution of the dental health movement, as well as of public health work in general.

DO YOU HAVE SOME PRACTICAL IDEAS?

In recent issues of THE JOURNAL, several articles have appeared under the title, "Do You Have Some Practical Ideas?" It is hoped that the suggestions contained in those articles have proved of practical value to many of our readers.

One of our members has raised this question, "Is there anything more practical for laying a sound practice foundation than knowledge?" After studying this question from every angle, we have come to the conclusion that knowledge is one of the most important essentials in a successful dental practice, but that its practicability is gaged by the manner in which it is used. It is a well known fact that there are individual practitioners who are well trained mentally, but when it comes to a question of diagnosis, for example, they do not use their store of knowledge. Then, there is that phase of knowledge which is dependent for its practical value on individual skill in interpretation. Some persons are unquestionably much more capable than others in constructing inlays, crowns, bridges and dentures, but it is not necessarily true that the skilful operator knows any more about the fundamentals of such work: he has but learned to make his hands do what his mind directs them to do.

The foregoing explanation of the practicability of knowledge is not in any way an attempt to minimize the value of knowledge nor to offer an excuse for failure to secure it. There is no doubt that successful dental care must be based on knowledge. The act of accurate diagnosis or the product of either the skilled or unskilled hand is definitely dependent on knowledge.

Therefore, for the practitioner who has leisure time on his hands these days, it is believed that no better use can be made of that time than to increase his store of knowledge and improve technical and operative skill. There are numerous dental books and periodicals which contain a fund of information. Dentistry is moving rapidly and many new and valuable data are being constantly offered to the profession. The practitioner who does not study these new developments soon finds himself hopelessly behind the times. The American Dental Association has established a library bureau in its central office through which it makes all printed dental knowledge available to its members. From this bureau, books may be borrowed and "package libraries" may be rented for a small fee. "Package library" is the name given to a collection of reprints and clipped articles dealing with any one subject. There is hardly a dental subject for which the Library Bureau has not developed a package library. With such a service available, there is no excuse for a member failing to keep up with the latest thought in dentistry.

On the matter of the improvement of technical skill, many of the societies over the country have been conducting study groups and extension courses. Attendance at such classes is bound to improve the technical ability of any dentist if he will seriously follow the helpful hints ob-

tained. It is true that, in some areas, study groups do not exist, but if a few interested individuals will get together in those areas, they can soon organize such groups, with great resulting benefits. In this connection, we must not overlook the value of attending the annual meetings of state and national organizations. Those meetings never fail to offer at least one worthwhile idea to the members in attendance.

Spare time can become valuable time if properly used. To use spare time in mournful thought or useless frittering is to miss a golden opportunity for self improvement and the building of a practice foundation for those better days that are surely ahead. Knowledge and improved technical skill do not come to us without effort on our part. They can and should become the product of the spare time which many of our members now have.

THE FATE OF TRAUMATIZED TEETH IN CHILDREN

Traumatization of the teeth is a systemic condition resulting from an injury. The injury generally results from some sort of an accident, such as with a motor car, school swings, a football, a baseball, and so forth. Dr. Herndon explained the fate of these teeth if left in the mouth and the fate if removed too early in life.

CASE 1.—A boy, aged 9 years, had the four upper centrals knocked loose, two of them completely out of the socket, the result of an automobile accident. The remaining two teeth were so loose that it required careful work to make the appliance that would hold the four in place. This being done, the two centrals were pushed into the sockets; the appliance was cemented in place, and the boy dismissed. This patient was examined each day for ten days, and every three days for one month. All four teeth were found nonvital, and at the time of presentation were still what one would call dead teeth, with very little process around the centrals. Of course, from the standpoint of health, the teeth should not be left in the boy's mouth; however, he was 9 years old and no sort of an appliance could restore the front teeth, as the permanent cuspids were not yet erupted. Therefore, the teeth were to be watched until the cuspids were in place, when the traumatized teeth would be extracted and a bridge inserted.

CASE 2.—A boy, aged 9 years, had his first upper bicuspid knocked loose while playing football. When he was seen at the office, extraction of the tooth was suggested, but the mother asked that it remain and that the boy be kept under observation. One year passed before the boy returned for other work, and the mother asked that care be taken with him, as a "heart ailment" had developed. Of course, the first thought was of the bicuspid injury, and this tooth was immediately extracted; in thirty days the boy had completely recovered. He had been able to go to school only one-half day each day, the other half being spent in bed to gain strength for the next day.

CASE 3.—A girl, aged 13 months, was thrown from her buggy. The first lower molar was knocked loose from the socket, but had remained in place seven years, when Dr. Herndon saw the patient. A chronic fistula had developed that opened under the chin, and the process was wasted away so that extraction was difficult without danger of breaking the lower jaw. Extraction was done, however, with no serious results. The patient died two years later from cancer, regarding the cause of which one may draw one's own conclusions. Dr. Herndon said that traumatized teeth can cause constant irritation, inflammation of the glands of the mouth, tumors of the jaw, extreme nervousness, malnutrition, abscesses, deformity of the mouth, irregular teeth, heart ailments, sinus trouble, rickets and arrested development of the bone structure, a harboring place for germs that will be carried into the blood stream causing a systemic infection that could result in any of the various disorders. In some cases, in older people, traumatized teeth are left in the mouth too long and are overused. In such cases, bridges are inserted and the overuse is relieved.—*Am. J. Dis. Child.*, February, 1933.

CURRENT LITERATURE

Some Factors Affecting the Setting of a Dental Amalgam (Marie L. V. Gayler, Brit. D. J., March 15, 1933, p. 269): The investigation detailed in this article was carried out on behalf of the Dental Investigation Committee of the Department of Scientific and Industrial Research. A close description of the experimental procedure is given with pictured instrumentation, charts, tables and graphs. The conclusions reached are that the most important factors in the change occurring during setting of an amalgam made from a commercial product are: (1) the presence exerted during the mixing of the alloy and mercury in the mortar; (2) the time of mixing; (3) the time of kneading, and (4) the packing pressure. Such factors as time of standing after mixing, of kneading and of the squeezing out of mercury after kneading have so small an effect under the conditions of the experiment that they are of little importance in comparison with those mentioned above. An amalgam has been made which satisfies the required conditions of an expansion of not more than 4 microns. The conditions under which such an amalgam is made are not very critical, provided one or two factors are kept constant. Amalgam made under the following conditions gives satisfactory results with regard to changes during setting: 1. The ratio of alloy and mercury shall be 1:1.75. 2. Time of mixing shall be one and one-half minutes. 3. Time of kneading shall be two minutes. 4. During the one and one-half minutes of mixing, heavy pressure shall be exerted for one-half minute of this time.

N. G. T.

Dental Diseases in Hawaii (Martha R. Jones, Nils P. Larsen and George P. Pritchard, Am. J. Dis. Child., April, 1933, p. 789): The authors make note of the association in literature of the development of bone and teeth and the fact that any condition affecting one affects the other. Jones had noted that a surface disintegration of enamel occurred in the teeth of puppies during recovery from rickets, but never during the active phase of the disease. While the bone was rapidly improving, the enamel would sometimes undergo rapid disintegration. On the other hand, while bone and dentin were undergoing profound degenerative changes, the enamel remained intact. Evidently, the bone and dentin forming mechanism were affected by the same cause. In the work done by these authors postmortem, bone and dental tissues of babies were examined and teeth erupted and unerupted were studied. Of 140 cases to date, microscopic studies of thirty have been made. Five are reported in the article. It was found that enamel and dentin do not parallel each other in formation. This they ascribe to the difference in origin of the tissues. Bone and dentin however do. This because of their mesodermic orgin.

N. G. T.

The Pathogenicity of Fusiform Bacillus and Spirillum of Plaut-Vincent (H. H. Lichtenberg, Marie Werner and Esther Volckmann, J. A. M. A., March 11, 1933): The authors assert that unexceptional proof of a pathogenic relationship of various clinical entities is wanting. The report purposes to record clinical and experimental observations bearing on the subject. Vincent was unable to reproduce lesions ascribed to fusospirochetal organisms in the mouth of animals. Weaver and Tunnicliff were unable to produce any disease in rabbits with pure culture. Smith was unable to produce abscesses in the groins of guinea-pigs with material from Vincent's infection without lowering the resistances of the tissue by trauma. The plausibility of the theory that these organisms are saprophytes is discussed; likewise the methods and drugs used in the treatment of lesions attributed to these organisms. Of the efficacy of the arsenicals, they say, it is difficult to explain the presence of these micro-organisms about the gums and in syphilitic lesions of the mouths of patients undergoing active antisyphilitic treatment. It is even more awkward to explain the development of an acute Vincent's infection in these patients. Since the literature tells of the lesions healing under medical treatment in from five to seven days and the cases untreated run their course in the same time, the authors referred children difficult to treat back to their parents advising that the children would get better. Such children were all well in the time mentioned above. The authors conclude that since these

organisms are found in practically every normal mouth, about spongy gums in pyorrhea alveolaris, ulcerative stomatitis, angina, tonsillitis, etc., it seems improbable that they are determinants in these conditions. The value of diagnostic smears for Vincent's organism as a means of establishing a pathogenic relationship of these organisms to a suspected lesion is questioned.

N. G. T.

Arsenic Poisoning Caused by a Mouthwash Containing Solution of Potassium Arsenite (H. Lowenburg, J. A. M. A., April 22, 1933, p. 737): A patient had been using the following mouthwash: wine of ipecac, 2 ounces; glycerine, 4 drams, and potassium arsenite (Fowler's solution) to make 4 ounces. The temperature, pulse and respiration were 98.6, 100 and 25, respectively. The blood pressure was 106 systolic, 70 diastolic. Admission diagnoses were Vincent's infection and anuria of unknown origin. The prominent features of the case were: a shallow lingual ulcer, moderate cervical lymphadenopathy, vomiting and nausea, with inability to retain even water. The writers summarize the case as follows: Arsenical poisoning may follow the use of an easily absorbable preparation of arsenic when used as a mouth wash; therefore, the practice is pernicious. Equally good results are attained in Vincent's and other mouth infections by the use of simple cleansing and oxidizing agents. Arsenic poisoning should be suspected in all cases of persistent vomiting when associated with anuria and a history of mouth infection.

N. G. T.

Is Fluorine an Indispensable Element in the Diet? (G. R. Sharpless and E. V. McCollum, J. Nutrition, March, 1933): Attention is called to the universal distribution of fluorine. It is present in plant and animal tissue. In some spring and well water, it is so abundant as to cause mottling of enamel. The question is still unanswered as to whether it plays a physiologic rôle or is present in tissue as an accident because it is ingested with all foods. Since Morichini first found fluorine in fossil elephant molars, many investigators have examined plant and animal tissues for it. Sharpless and McCollum present careful experimental procedures and from them conclude that young rats (16-18 days old) contain little if any fluorine; within certain limits, the fluorine content of bones and teeth increases with age; the fluorine content of teeth and bones vary. Fluorine can be eliminated from the teeth with no gross deleterious effect. There is some slight indication of proliferation of capillaries in the pulps of teeth.

N. G. T.

The Third Molar (W. K. Fry, Brit. D. J., April 13, 1933): Fry stresses the prominence into which lower third molars have come and the fact that in America are specialists who confine their practice to the extraction of such teeth when impacted. Little regard has been given the prevention of impaction, consideration of which is long overdue. The prevalence of impaction of these teeth in America he ascribes to the orthodontist's horror at extracting healthy teeth. Roentgenograms will enable practitioners to visualize future conditions and decide on their treatment. The points to be observed are: (1) any tendency toward crowding of the teeth; (2) the presence of any heavily filled, decayed or devitalized teeth and (3) the presence and position of any third molars. If any teeth, say the first permanent molar, are heavily filled or devitalized, their extraction should be considered to let the second molar advance, thus giving room to the third molar. Difficulty arises if the teeth are all healthy. It is preferable that first molars and second bicuspids be extracted, according to the amount of space required. This line of treatment may be followed up to 17 years. It is preferable to extracting the second molar, with the unsatisfactory masticatory results. When removal of third molars is indicated, it should be done before the roots are formed. The writer seeks to save the patient from the more serious operation if it is done later. The too frequent sequelae of late operations he would avoid: acute infection and fracture of the mandible.

N. G. T.

The Food Value of Milk in Children in Association with Dental Caries (A. C. Frazer, Brit. D. J., April 13, 1933): Frazer presents his findings under three heads: (1) general physiologic properties of milk; (2) etiology of dental caries with reference to diet; (3) raw milk therapy and its possible mode of action. On the effect of sterilization by heat, either boiling or pasteurization, he quotes Savage, who collected evidence for and against pasteurization. Pasteurization probably makes cow's milk more nearly approximate human milk. The destruction of vitamin C is unimportant, as it is usually inadequate in amount and has to be supplemented in both raw and

pasteurized milk. Under the etiology of caries, the author emphasizes the morphologic and local enamel fault factors. He quotes Rypins to throw doubt on the importance of fermentable débris and oral hygiene. He concludes that milk contains all the essentials for growth as all the vitamins are in it in varying amounts. Boiling reduces the nutritive value of milk but pasteurization does not. In caries, vitamin deficiency plays no part. N. G. T.

Committee Completed to Review Questionable Advertising (Printer's Ink, A Journal for Advertisers, Feb. 9, 1933, p. 77): As is inferred from the title, advertising feels the urge of Spring to clean house. A committee of five has been appointed from the Association of National Advertisers and American Association of Advertising Agencies to be a court of last resort for questionable advertising. It has taken a stand against the following: 1. False statements or misleading exaggerations. 2. Indirect misrepresentation of a product or service through distortion of details, either editorially or pictorially. 3. Statements or suggestions offensive to public decency. 4. Statements which tend to undermine an industry by attributing to its products, generally, faults and weaknesses true only of a few. 5. Price claims that are misleading. 6. Pseudoscientific advertising, including claims insufficiently supported by accepted authority or that distort the true meaning or application of a statement made by professional or scientific authority. 7. Testimonials which do not reflect the real choice of a competent witness. A statement issued by a spokesman for the committee reviews the spread of artificial measures, which, through intense sales rivalry, have lowered standards and increased pretensions. This is reflected in advertising. "This has come about so insidiously, one step at a time, under the pressure of competition," it is stated, "that we are aroused at no one stage of the process. The public is gradually inured, its sensibilities are not shocked. It may even be amused and intrigued. But thoughtful publishers and advertising men have been watching the process with grave concern, fearing a revulsion on the part of readers and a serious loss of influence in advertising. There seems to be an interesting parallel between this new era of modern advertising technique and the new era of finance which came to an untimely end. In both cases important leaders had built up in their own minds and in the minds of many others the illusion that the old principles of sound value, good-faith and fair play had yielded place to some quicker or more ingenious road to results. Finance had paid a dear price for its illusion. Advertising may do so too. Advertising is a $2,000,000,000 industry, widely effective in distributing goods, widely influential in raising standards of living, a large factor also in supporting credit and in making cheaply available current literature and news. It is a constructive business and will inevitably be kept so, either by outside control or by self-regulation. It is up to the advertising world to say which."

N. G. T.

Foreign Literature

Intestinal Hemorrhage of Dental Origin (Drs. Dreyfus and Lapit, Rev. Odontol., February, 1933): Two case reports are given of intestinal hemorrhages that had persisted for years. The hemorrhages were ascribed to numerous causes with treatments based upon the varying diagnoses. The oral condition of one was described as deplorable: general pyorrhea, tartar in quantity, the roots of almost all the molars bathed in pus. All medical treatment failed. Surgery was advised. Finally, the oral condition was considered and attention given it. The result in both cases was recovery. N. G. T.

New Determinations on the Biology of Granulomas and Therapeutic Consequence (P. D. Bernard, Rev. Odontol., March, 1933): Consideration is given to the apical granuloma as being nonspontaneously resorbable because its biologic center, the root canal, is isolated and protected against phagocytic action. The biologic phase of root canal treatment has not been thoroughly or adequately considered. The granuloma is maintained therapeutically when certain drugs, formalin particularly, are used because they inhibit the activities of the reticulo-endothelial cell. A clinical cure, the mere reestablishment of comfort and service, is not enough: the eradication of the granuloma is necessary. A canal with partial filling of whatever material leaves the infection and maintaining cause, and this beyond the reach of phagocytic agents. The ideal is the disinfection of the canal and the apical closure of it with a substance that is nonirritating to the periapical tissues. N. G. T.

Effect of X-rays on the Growing Jaws of the Dog (K. Herold, Deutsche Monatschr. f.

Zahnhlk., Vol. 49, 1931, pp. 97-127.): The effects in two dogs of three exposures to roentgen-rays, twelve and one-half, twenty-three, and seventeen and one-half minutes in duration, were studied. The control animal was a litter mate. The effects were: 1. Inhibition of general growth. 2. Retardation of the development of the jaws in respect to growth in length and width on the side that was irradiated. 3. Disturbance and persistence of the deciduous teeth, most of which are found on the side that was irradiated. 4. Defective eruption of the permanent teeth. This was more prominent on the side of exposure. 5. Irregularity in arrangement of the odontoblast. 6. Severe injury of all glands that were exposed. 7. Underdevelopment of the hypophysis. The author points out that the primary cause of the foregoing disturbance may be either the roentgen-ray exposure or the changes in the hypophysis.

ISAAC SCHOUR

Hyperthyroidism Produced by the Use of Iodine in Dentistry (W. Raab, Ztschr. f. Stomatol. Vol. 29, 1931, p. 637-643.): The author reports twenty-three cases in which, as a result of the use of iodine in dental treatment, hyperthyroidism was induced or an already existing hyperthyroid condition was aggravated. The author believes that the use of iodine in any form or amount should be avoided wherever possible; that its use should be confined to cases in which substitution by other agents is not possible, and that the patient should be instructed in regard to the dangers of the use of iodine, the symptoms of iodine poisoning, and the necessity of medical treatment during long use of iodine.

I. S.

Etiology of Caries and Pyorrhea Alveolaris (P. Adloff, Vierteljahrsschr. f. Zahnheilk., Vol. 49, 1933, pp. 17-44.): The author considers both caries and alveolar pyorrhea as infectious diseases, although infection is not to be regarded as the primary factor in the etiology. Thus, caries may play havoc in the apparently most favorable conditions; while, in other cases, a complete immunity is found in apparently most unfavorable conditions. As in all other infectious diseases, the important thing is the predisposition. The latter may be inherited or acquired. All circumstances indicate that both caries and alveolar pyorrhea are degenerative diseases. This explains their frequency in civilized man. The degenerative process may involve the entire body and result in a general lowering of resistance or may express itself locally. In the latter event, definite organs or portions of them are defectively formed or definite life cycles take an abnormal course. Pyorrhea alveolaris is particularly instructive as far as the so-called predisposing causes are concerned. Inflammatory insult to the gingivae never results in alveolar pyorrhea, but leads only to a marginal periodontitis, if the disposition to pyorrhea alveolaris is not present. Similarly, in caries, the retention areas play only a local rôle and do not explain the spread of the disease. In both cases, the local factors determine only the clinical picture. They facilitate the development of the infection and influence its course.

I. S.

Importance of Periapical Infections and Their Treatment, (Imm. Ottesen, Norske Tannlaegefor. Tid., March, 1933, p. 111): The author thinks that the small granulomas at the root ends of treated teeth are not necessarily of any direct danger to the patient. He does not insist on their treatment in patients wholly well. He does recommend a yearly roentgen-ray check-up to find out whether there is any increase in the size of the granuloma. If the focus is growing, he advises that it be treated either surgically or, if the root canal or canals are easily accessible, by refilling of the tooth. His surgical treatment consists of either the age-old replantation method or the root resection method described in 1880 by Dr. Farrar. The replantation method, which, according to the author, ought to be used considerably more than it is at present, is the simpler of the two. The tooth is extracted, the root ends are cut off and the openings of the root canals are sealed with either tin or copper amalgam. The tooth is then put back in its socket. The author follows the routine procedure in his root amputations. He is not adverse to surgical interference even when the infection is acute. He ends his article by showing five typical cases of focal infection, which were cured either by surgical interference or by treatment of the teeth.

E. G. JACOBSON

Are Ordinary Fruit Acids Harmful to the Teeth? (Guttorm Toverud and Signe Jonsgar, Norske Tannlaegefor. Tid., March, 1933, p. 121): The authors checked up on some results obtained by the Swedish dentist Lindstrom as to the action on dental enamel of

acids normally contained in foods. His results seem to indicate that orange juice and a solution of sodium bitartrate both would destroy the enamel of the teeth of dogs in a few months. The p_H of the solutions used was about 3.7. The authors employed a litter of healthy pups for their experiments. These dogs were treated twice a day with either orange juice or an acid tooth paste. The results obtained correspond with those of Pickerill and Wallace, indicating that fruit acids are not injurious to teeth of dogs *in vivo*. Furthermore, the rubbing of fruit acids against enamel defects changed the dull enamel within this territory to a very shiny enamel, thus probably indicating a beneficial effect.

E. G. J.

Ability of the Saliva to Neutralize Acids Introduced into the Mouth, and Its Importance as a Means of Protection Against the Decalcifying Action of Fruit Acids and Other Acid Substance in Foods and Liquids (Carl Naeslund, Svensk Tanklak. Tidskr., January-February, 1933, p. 1): Carl Naeslund draws the following conclusions from test tube and animal experiments: Human saliva possesses marked ability to protect the enamel and cementum from decalcification by fruit and other acids. This neutralization is caused not by the p_H of the saliva, normally 6.8-7, but by the action of buffer substances—carbonates, phosphates—contained in it. Some other conditions might also affect the resistance of enamel to free acids, conditions possibly directly connected with the enamel structure. (This point is not explained in the article). The author also considers the possibility of the enamel taking up calcium from the saliva, thus remineralizing itself after the action of acids.

E. G. J.

Cooperative Clinic of the Amsterdam Dental Society (Tydschr. v. Tandheelk., January, 1933): Less than half the membership of the Amsterdam Dental Society (132) participate, as cooperative owners at $40 per member. Of 3,176 new patients, 3,077 were accepted; 50 per cent needed emergency treatment only; 50 per cent remained for more or less complete dental service. Of 3,153 old patients who returned, 46 per cent received additional treatment. Total operations performed during the year: 8,905 extractions, 1,863 prophylactic treatments, 9,115 fillings, 916 root-canal treatments and 9,933 artificial teeth placed. The officers note only a slight loss in volume of patients, 3 per cent, notwithstanding the stress of the times.

F. VAN MINDEN

"Molarization" of Upper Bicuspids (Th. E. De Jonge-Cohen, Tydschr. v Tandheelk., March, 1933): Five instances of molarization of the upper bicuspids are described. In connection with this, the manifestation of the superfluous distolingual tubercle, called in Bolk's notation "Conus 4" represents a phenomenon which oversteps the limits of a normal variability to such a degree that it may be reckoned among the most rarely occurring deformities of the human dentition.

F. VAN M.

Actinomycosis of the Oral Cavity in Dutch East India (R. Franssen, Tandheelk. Corresp. Nederlandsch-Indie, January, 1933): Contrary to current opinion, actinomycosis occurs in India also, in the form of a disease of the tongue and jaws. To date are known a case of tongue actinomycosis in a European and jaw actinomycosis in a Javanese (woman) and in an Indo-European (man). The history of the last case proves that knowledge of this disease is necessary for the dentist in India.

F. VAN M.

Occurrence of Tumors of the Small Salivary Glands in the Mucosa of the Oral Cavity, (R. Franssen, Tandheelk. Corresp. Nederlandsch-Indie, March, 1933): Fourteen mixed tumors of the mucosa of the mouth were described: three of the palate, two of the lips and seven of the cheek. Eleven were in descendants of Indian races. These tumors are benign, but are often mistaken for malign (clinically). Especially in the tumors of the hard palate, where carcinoma is very rare, is this the case. Biopsy is always necessary to avoid unnecessary operations. F. VAN M.

A Case of Idiopathic Trigeminal Neuralgia Cured by Vesication (K. Petropulos, Greek D. Rev., April, 1933): The therapeutic effects of vesication are known of old, but because of possible undesirable consequences, are rarely employed. In July, 1932, a healthy looking mother of seven, aged 46, came in with terrific pains radiating from the area of the right mental foramen. After a thorough examination of the teeth and of the head in general, injection and other treatment were instituted. On the fifth day, no relief having been obtained, vesication was carried out in the mastoid area of the same side. The pain ceased the next day and has not recurred.

D. T. GALANOS

MISCELLANY

BOOK REVIEWS

Glory of Earth. By Anderson M. Scruggs. 75 poems. 95 pages. Price, $2. Published by Oglethorpe University Press, Oglethorpe University, Ga.

Out of the South has come a poet, a genial poet touching with tinkling melody the heart strings of the people and lending a rare fragrance to cheer the minds of men. Dr. Anderson M. Scruggs of Atlanta, Ga., has written a book of poems called "Glory of Earth," and the fact that he is a leading dental practitioner and a member of the teaching staff of the Atlanta-Southern Dental College will lend added zest to the pleasure of our members when they read his poems. There are seventy-five of these rare literary cameos in the book, and the discerning reader will want to go back to them again and again. Most of the poems have been published in leading magazines, such as *Harper's, The Forum, Century, The Golden Book and The North American Review,* and it is a matter for congratulation that they have been gathered in a single volume. To all who love good literature, this book will come with a refreshing sweetness that puts to shame much of the somber pessimism and sordidness of the day. It is a temptation to make extracts from these poems, but the embarrassment would be to know where to begin or rather where to stop. If we were to venture any selections we might mention "Silent lover," "Recompense," "Night Snow Fall," "Birds at Dawn," and—but all of this is mere aggravation. Read the book and know what real poetry is.

A Short History of Dentistry. By Lillian Lindsay. Published by John Bale, Sons & Danielsson, Ltd., 85-91, Gt. Titchfield Street, London, W. I. Price, 3s 6d net.

This book, as its name implies, is short—only eighty-five pages—but of delectable reading. As one reads, its shortness invites a shadowy criticism—a wish that it were longer. Also the reader wonders why photography was not employed to give the developmental progress of instrumentation and reconstruction. Doubtless, cost was the reason. The work is not divided into chapters, but the subjects are inserted in side notes. It is a compact statement in splendid type of convenient size and low in price. It is bound in cover, which leaves it less durable than its contents deserve.

N. G. T.

Prophylactic Odontotomy: Simple Procedure for the Prevention of Caries in Pit and Tissue Cavities. An Operative Manual Based on the Work of the Hyatt Study Club of New York. Price, $1.50. 104 pages, 53 illustrations. Published by the Macmillan Company, New York City, 1933.

A small book weighed down with a ponderous title—a title that has in its sound and portent the "mountain's travail" the text being the surprising and disappointing mouse. "Odontotomy" is used within the meaning of its Greek derivation, but it supplants simple and more direct, commonly used and easily understood English forms. The theme of the book is the elimination of fissures and pits to prevent decay, an idea presentable in a sentence, discussable in a brief paragraph. It is safe to say that the first eleven pages present the subject matter indicated by the title; the remainder is mere book building. Chapters two to ten inclusive are the primary elements of every dentist's education; the specific technic a mere telling of common sense instrumentation that any one would visualize the moment he undertook the job—provided he undertook it. The ideal of prevention offered by the author is appealing, as it must ever be, but no common acceptance will ever be attained for what is too apparently a questioned method.

N. G. T.

Book Received

New Systems in Bridge Prosthesis. By C. I. Brotsos, Athens, Greece. From the illustrations, this book written in the Greek language would appear to be a very creditable one.

CORRESPONDENCE

International Dental Federation (F.D.I.)

To the Editor: Since communications have been published in the papers concerning a

prize competition of the Fédération Dentaire Internationale, stating that this competition would involve the torture of animals on a large scale, we request you to be good enough to publish the following statement.

At the International Dental Congress, held in August, 1931, in Paris, one of the seventeen sections expressed the wish that a prize competition be inaugurated in order to solve the problem of the treatment of infected root-canals, a septic condition which, as is well known, may be the cause of a number of serious chronic diseases.

This request has been referred to the Executive Council of the Fédération Dentaire Internationale, constituted of representatives of forty-three affiliated countries, which will consider the question at the session which takes place in August at Zürich.

This prize competition has evoked a flood of protests, because of the misconception that it entailed the torture of a large number of animals.

To those who know the preparatory work which has been done by the Scientific Commission and which has led up to this prize competition, any idea that these experiments could be undertaken by the ordinary physician or dentist is quite absurd. The ordinary practitioner has at his command neither the knowledge nor the facilities which are necessary to comply with the humanitarian and scientific safeguards which will be required.

In reality, these experiments can only be carried out at a few university centers.

The Bureau of the F.D.I. carefully considered the whole question at a meeting held at The Hague a few days ago, and in order to remove the misconceptions which have arisen, will propose that the following stipulation be inserted:

No experiments will be considered to have complied with the stipulations of the competition unless they are carried out in the scientific laboratory of a recognized University.

The F.D.I. will, when the time comes, publish the names of these universities.

In the name of the Bureau of the Fédération Dentaire Internationale.

G. Villain, *President*
Paris

Charles F. L. Nord
Secretary General
The Hague

DENTISTRY TO HAVE ELABORATE EXHIBIT AT CHICAGO WORLD'S FAIR

During the coming summer, dentistry in its health relationships will be called prominently to the attention of the fifty million or more people who will attend A Century of Progress Exposition in Chicago, and during the officially designated "Dental Week" of the Exposition, August 7 to 12, the Diamond Jubilee of the American Dental Association will be held at the Stevens Hotel in Chicago in conjunction with the Chicago Centennial Dental Congress, with an anticipated attendance of 15,000 members of the profession from all parts of the world. It is, therefore anticipated that this will be the largest meeting of dentists in the history of the world, a large majority of whom will bring their families with them to attend the Exposition.

Dental Exhibit at the Exposition Lasting Five Months

The dental exhibit at the Exposition will be unique in many respects. It is a noteworthy fact that this is the first great Exposition which has ever invited professional groups to participate. Thus, an opportunity is presented to dentistry for the first time to call its service in the field of human welfare to the attention of the public in a large way. There is little doubt that the majority of the millions of people who will attend the Exposition will see the dental exhibit, located as it is in the principal line of travel of those who enter the Hall of Science. The transparent man, an illuminated figure which affords a study in physiology, will command the attention of almost every visitor, and it will hardly be possible to miss the adjacent dental exhibit.

Dentistry has, during recent years, assumed important obligations and responsibilities in the health program and the effect of the lessons which may be taught at the Exposition is likely to be more far-reaching than any one can, at this time, imagine. It has, therefore, been deemed important that dentistry's exhibit shall have the highest educational value, to the end that people generally will become more interested in the problem of oral health.

The exhibit has been so developed as to present a limited number of rather striking features which every passerby must see, rather than show a multitude of small things which would attract less attention. The main features of the exhibit, which will be completely installed during the month of May and

ready for the opening of the Exposition, May 27, are the following:

THE TALKING TOOTH

The Talking Tooth, which will be about 9 feet high and 4 feet wide, will consist of a framed ground glass, behind which will be 1,200 small electric lights arranged in an elaborate system of shadow boxes and operated by a new photographically controlled mechanism. This will show a beginning decay in the occlusal surface of a first molar which gradually progresses to involve the enamel and dentin and then exposes the pulp. The pulp will become red as a result of inflammation and eventually will turn green to represent the death of the pulp tissue. Thereafter, an abscess will develop in the bone and eventually assume such proportions as to result in the loss of the tooth. This is called the Talking Tooth for the reason that it will, through a synchronized phonograph mechanism, tell its own story and will take occasion to give the audience a number of lessons as to the importance of early care which would have prevented the loss of the pulp and later the tooth itself. In the last stage of this picture, the Talking Tooth deplores the fact that it must be extracted; it bids the audience goodbye, and then disappears from the picture leaving the bone and supporting structures with the empty socket.

THE PYORRHEA TOOTH

The Pyorrhea Tooth will be similar to the Talking Tooth with the exception that it will portray the beginning and progress of a pyorrhea pocket due to an open contact between two teeth. The lights will be similarly controlled by a phonographic mechanism and the phonograph will state some of the most common causes of pyorrhea. The presence of pus will be shown in the pocket at two or three different times during the progress of the picture, and attention will be called to the fact that this tooth must also be lost as a result of lack of early care.

PROGRESS OF DENTAL SERVICE

The progress of dental service in the past 100 years will be shown through a medium of the automobile turntable, on which four stages will be erected. These will appear in regular order as the turntable revolves and will show, first, the practice of dentistry 100 years ago by a scene in an early American cabin where an itinerant dentist has called. He has laid his pack containing his meager equipment on a table. He makes an amalgam filling for the mother of the family, who is sitting in a rocking chair propped back with a stick of wood, and receives his dinner in return. The second scene will show a dental office of fifty years ago, fully furnished with the equipment of that day. It will also show the dentist, his assistant and patient, dressed in the costumes of the time. The third scene will show the fully equipped dental office of 1933, and the fourth a dental hygienist's office of 1933, with a 3-year-old child in the chair. The last scene is included for the particular purpose of calling attention to the importance of the early care of children's teeth.

TOOTH BRUSHING EXHIBIT

This exhibit will be motor driven and will consist of a hexagonal structure, on each face of which will be an aluminum head with accompanying arm, hand and toothbrush. Each of the models will demonstrate continuously the proper motion of the toothbrush in a particular position in the mouth. The entire hexagon will revolve on the base so that the spectator may observe the six demonstrations by standing in one position for a period of three minutes.

MASTICATION EXHIBIT

This exhibit will also be motor driven and will consist of a skull of a tiger as illustrating the masticatory apparatus of the meat-eating animals; the skull of a mountain sheep as illustrating the herbivora, and the skull of a man as illustrating the combined mechanism of the other two. Beside the skull of the man will be a set of artificial teeth mounted on an articulator, and the motions of the mandible of the man and the "mandible" of the articulator will be synchronized, thus exemplifying the scientific studies of the dentist which have laid the foundation for an understanding of tooth forms and jaw movements.

PROFESSIONAL DENTAL EDUCATION

This will be a rather unique exhibit intended to impress the public with the progress that has been made in dental education and the present day training of the dentist. It will consist of a very beautiful model of the building in which the first dental school in the world, the Baltimore College of Dental Surgery, was established in 1840. There will be a much larger building representing dental education of today, which will show, in section, a room for each course of study. Each room will be equipped with miniature furniture and

cutouts of students at work, and will be separately illuminated. A model of this building was completed some time ago and was inspected and approved by the members of the American Association of Dental Schools at their meeting in Chicago in April.

MOVIE THEATER

There will be a movie theater which will seat about seventy-five and the screen will also be in view of possibly 200 additional persons who may stand in the aisles. A new film has been prepared the showing of which requires twelve minutes. It begins with a nurse lifting a newly born baby from its crib. By animation the film will show the calcification of the teeth at birth and the gradual development up to eighteen years. Many lessons as to diet, dental care and other matters will be brought out in the talking portion of this demonstration. This movie theater will also have three large mural paintings which will illustrate the effort that is being made by the profession to carry the lessons of dentistry to the out of the way places of the world. The dentally equipped Ontario railway car; the Pennsylvania dental office mounted on a large motor truck; the dental automobile trailer, and other similar means of reaching the far away districts will be a part of these pictures.

DENTAL PUPPET SHOW

One of the most interesting features from the child's point of view will be a dental puppet show in which model teeth will be dressed as puppets. It will be presented for the children at 11 a.m., 2 p.m. and 4 p.m. each day except Monday. This show will also carry its lesson in diet and the proper care of the teeth.

OTHER FEATURES

Aside from these special features, there will be other exhibits in show cases and glass wall-cases which will show many items of professional development which should be of interest to the public.

It is readily admitted that but a brief description of the dental exhibit has been given. In presenting this exhibit to the millions of Fair visitors, it is believed that there will result a better appreciation of dentistry as a health service. Every dentist is urged to prevail on those of his patients who will visit the Exposition to pay particular attention to the story of dental progress as revealed in the Hall of Science.

No layman's vacation of 1933 that does not include A Century of Progress Exposition can be considered complete and no dentist's vacation can be considered complete that does not include the Diamond Jubilee of the American Dental Association in conjunction with the Chicago Centennial Dental Congress.

ACTIVITIES OF THE COMMITTEE ON LEGISLATION AND CORRELATION

By HOMER C. BROWN, Chairman
Columbus, Ohio

The activities of the Committee on Legislation and Correlation during the past few months has been directed toward safeguarding the interests of the profession and the public, as follows:

1. The committee cooperated with others in opposing the Taber amendment. This was a House amendment to the Army Appropriation Bill, which was stricken out in the Senate and was concurred in by the conferees. This amendment would have deprived the members of the Dental Corps of certain benefits accruing to them as contract dental surgeons prior to being commissioned as dental officers. In this connection, it may be recalled that by a decision following the passage of the National Defense Act in 1916, the service of contract dental surgeons in computing length of service for promotion, etc., was recognized. Our legislative committee, at that time, sponsored the movement in support of this decision.

2. The Trustees, at their February meeting, decided that the American Dental Association should not become involved in the question of governmental retrenchment wherein its representatives were involved, except where there was evidence of a distinct discrimination.

3. When the embargo on gold developed, early in March, I was in touch with Washington by telephone, telegraph and correspondence, as well as with various gold manufacturers, and sent the following telegrams to the President and the Secretary of the Treasury on March 7:

As chairman of Legislative Committee American Dental Association I respectfully call attention to necessity for providing for withdrawal of adequate supply of gold to be used in practice of dentistry as health conservation measure. An estimate of amount necessary can be obtained from reports by manufacturers of dental gold.

These telegrams were promptly acknowledged and, under date of March 14, the committee was advised that arrangements had been completed for withdrawal of gold for dental purposes. Dr. Dittmar, President of the American Dental Association, also sent a telegram and, of course, all gold manufacturers and dealers were cooperating to have this embargo removed; but it is the contention of the committee that the health phase of the problem was an important factor in securing prompt and favorable action.

4. The committee cooperated with the officials of the District of Columbia Dental Society in defeating a boiler inspection bill applying to the District, the provisions of which, as first drawn, were broad enough to include dental air compressors, vulcanizers and autoclaves. This bill was amended in committee to exempt such dental equipment, but the amended bill never passed.

5. Another District bill prohibited the use of living dogs for scientific experimental purposes and the committee cooperated with others in opposing this legislation, which also failed to pass.

6. The committee has cooperated with various state dental societies in their legislative programs. Some of these were seeking new legislation to strengthen their state dental laws and others were opposing destructive legislation. In one instance, Dr. Pinney, Secretary of the American Dental Association, referred a letter from the president of the Puerto Rico Dental Association advising that a resolution had been introduced and passed by the Senate directing the board of dental examiners to license a certain individual without his meeting any of the requirements of their present dental law. An appeal was made to send a cablegram of protest to the governor. This was done, and was followed by a letter presenting arguments in opposition to this type of legislation. In addition, contact was made with the Puerto Rico representative in Congress both by direct correspondence and through Dr. Charles D. Cole. This resolution later passed the House and a letter received from the governor, May 4, advised that it has been referred to the board of examiners for recommendation and clearly indicated that it would be vetoed.

7. In cooperating with the officials of the various state societies, we regret to advise that thirty-one bills, relating either directly or indirectly to dentistry, were introduced in the last session of the California legislature. Only two or three of these were sponsored by organized dentistry in the state.

8. West Virginia, Oregon and North Dakota and possibly other states passed laws during recent sessions of their legislatures providing for the appointment of dentists on their state boards of health. North Carolina has enacted a law requiring that a dentist be appointed a member of every county board of health in counties where a dentist is available.

9. Oregon enacted an improved dental law and Maryland, Ohio and probably other states strengthened their dental laws, especially with reference to giving the board added authority to better regulate the dental advertisers. The Maryland law just recently signed by Governor Ritchie prohibits the practice of dentistry by a corporation or under a trade name.

10. There is pending in the Illinois legislature a bill which, if enacted, will give Illinois a greatly improved dental law. A bill was also introduced providing for an individual's taking his own impression under the direction of another person or from printed instructions, the case to be constructed by a laboratory technician. The purpose of this was seemingly to legalize the practice of the so-called "Chicago Dentists" in rendering dental service by mail and other irregular methods. This bill has just recently been withdrawn.

11. In discussing the membership question, a recent letter from Dr. Hamel, president of the Canadian Dental Association, advises that their membership has been increased and that the profession of Canada recognizes the necessity for closer cooperation, through organizations, in these trying times. He also requested a copy of a legislative pamphlet prepared last Fall for the ten members of his executive board.

12. Dr. Dittmar and I conferred with the director of industrial alcohol regarding two minor problems which had recently developed and with the solicitor of the postal department with reference to the advertising scheme of the so-called "Chicago Dentists" being an infraction of the Postal laws.

13. During a meeting of the executive council of the Virginia State Dental Society, it developed that the dental profession of Virginia pays an occupational or license tax of $25 a year. They are also taxed in one or two other ways. This $25 tax, which has been

in effect for a great number of years, applies to a number of other professions and vocations, but the physicians were relieved of this some time ago on a basis that they were required to report communicable and other diseases, births and deaths to the state board of health and bureau of vital statistics. This vocational or license tax was a surprise to me and I will be interested in knowing whether this condition prevails in other states.

14. The Ohio legislature is to reconvene, May 15, after a recess of some weeks, to enact a new tax law, including both sales and income tax. Exemption of food necessities only is now contemplated, but I have been to the governor's office this morning in a conference with members of the state tax commission, in the hope of convincing them of the necessity for exempting all items for the alleviation of human suffering and the correction of physical defects. Both the governor and commission were impressed with the need for some modification and have requested our committee to appear before a subcommittee of the joint tax committee Monday night and present our arguments. It is my contention that the proposed income tax bill should meet all requirements as relates to the professions rendering health services. However, the need for increasing our revenue is so urgent that we may have considerable difficulty in securing any additional exemptions.

15. Supplementing the court decision data contained in the January issue of THE JOURNAL on pages 171-172, you are referred to the *Journal of the American Medical Association,* April 1, pages 1061-1062, for additional information relating to the "Painless Parker" litigation.

16. Complaint was recently filed with the Ohio State Dental Board for revoking the license of a rank advertiser for various irregularities. Hearings, which required a full week, were held in Cleveland, but the board has not rendered a decision in this case.

17. J. E. Buehler, secretary-treasurer of the Montana Dental Society, was authorized by resolution of his society to prepare data emphasizing the advantages of organized dentistry. It is my understanding that every activity of our Association has loyally cooperated with Dr. Buehler and he has presented a most excellent review of the activities and various developments of his state society, as well as recent activities of the American Dental Association. A report of that section relating to the American Dental Association will appear in the July issue of THE JOURNAL.

NEWS

University of Pennsylvania Celebrates Half Century of Progress: The celebration of a half century of progress in dentistry was held at the University of Pennsylvania, Philadelphia, May 18, in the Irvine Auditorium. Addresses were given by Prof. Herbert S. Jennings, who spoke on "The Biologist's Outlook on the World," and Surgeon-General Cumming, who spoke on "The Relationship of Dentistry to Public Health." The degree of doctor of science was conferred on Herbert S. Jennings, Ph.D., John Valentine Mershon, D.D.S., Milo Hellman, D.D.S., Leroy M. S. Miner, M.D., D.D.S., and Charles Root Turner, B.A., D.D.S., M.D., and the degree of doctor of laws on Samuel P. Capen, Ph.D. At the dinner given at 7 p.m., Dr. Miner spoke on "The Field of Dentistry," Dr. Capen on "Dental Education," and Dr. Thomas S. Gates, on "The Dental School in the University."

DEATHS

Costello, Daniel, Grand Rapids, Minn.; Northwestern University Dental School, 1900; died in February; aged 60.

Summa, Richard, St. Louis, Mo.; University of Iowa, College of Dentistry, 1890; died, April 8, suddenly, from a heart attack.

Ward, G. W., Wellington, Kas.; Kansas City Dental College, 1898; died, February 24; aged 60.

ANNOUNCEMENTS*

CALENDAR OF MEETINGS

American Dental Association in conjunction with the Chicago Centennial Dental Congress, Chicago, Ill., August 7-12.

American Academy of Periodontology, Chicago, August 3-5.

American Full Denture Society, Chicago, August 6-7.

American Society of Oral Surgeons and Exodontists, Chicago, August 4-5.

American Society of Orthodontists, Oklahoma City, Okla., November 8-10.

Association of American Women Dentists, Chicago, Ill., August 7.

Association of Military Dental Surgeons, Chicago, August 8.

Dental Alumni Association of American University of Beirut, Syria, June.

Fédération Dentaire Internationale, Edinburgh, July 22-27.

International Congress of Radiology, Zurich, Switzerland, July 24-31, 1934.

Society for Advancement of General Anesthesia in Dentistry, New York City, third Monday in February, April, October and December.

Southern Society of Orthodontists, Hot Springs, Va., November 13-15.

National Association of Dental Examiners, Chicago, August 7.

American Dental Assistants Association, Chicago, August 7-12.

American Dental Hygienists' Association, Chicago, August 7-12.

District of Columbia, at George Washington University, Washington, D. C., second and fourth Tuesdays in each month from October to June, inclusive.

STATE SOCIETIES

June

Arkansas, at Little Rock (5-7).
California (Southern), at Los Angeles (5-7).
Colorado, at Colorado Springs (19-21).
Georgia, at Savannah (12-14).
Maine, at Rangeley Lake (22-24).
Mississippi, at Gulfport (15-17).
Nevada, at Reno (3).
New Hampshire, at North Conway (1-2).
North Carolina, at Chapel Hill (6-8).
Oregon, at Portland (21-24).
South Dakota, at Watertown (26-27).
Utah, at Ogden (1-3).
Washington, at Yakima (June 30-July 2).
Wyoming, at Laramie (June 30-July 1).

STATE BOARD OF DENTAL EXAMINERS

Alabama, at Birmingham, June 26. E. W. Patton, Secretary, Comer Bldg., Birmingham.

Arkansas, at Little Rock, June 19-22. Clarence W. Koch, Secretary, Donaghey Bldg., Little Rock.

California, at Los Angeles, June 19. K. I. Nesbitt, Secretary, 450 McAllister St., San Francisco.

Colorado, at Denver, June 6-10. Zenas T. Roberts, Secretary, Metropolitan Bldg., Denver.

Connecticut, at Hartford, June 28-July 1. Almond J. Cutting, Recorder, Southington.

Delaware, at Wilmington, June 21-22. W. S. P. Combs, Secretary, Middletown.

Florida, at Jacksonville, June 21. R. P. Taylor, Secretary, Jacksonville.

Georgia, June 1. R. C. Coleman, Secretary, Atlanta.

Indiana, at Indianapolis, June 14. J. M. Hale, Secretary, Mt. Vernon.

Iowa, at Iowa City, May 29-June 1. Hardy F. Pool, Secretary, Mason City.

Kentucky, at Louisville, June 7-10. Robert L. Sprau, Secretary, 970 Baxter Bldg., Louisville.

Louisiana, at New Orleans, June 12. Joseph L. Webre, Secretary, Audubon Bldg., New Orleans.

Maine, at Augusta, June 24. Alton H. Swett, Secretary, 192 State St., Augusta.

Massachusetts, at Boston, June 13-16. W. Henry Grant, Secretary, State House, Boston.

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*Announcements must be received by the fifth day of the month in order to be published in the forthcoming issue of THE JOURNAL.

Minnesota, at Minneapolis, June 16-24. Walter H. Smith, Secretary, 2337 Central Ave., Minneapolis.

Mississippi, at Jackson, June 20-23. T. Ford Leggett, Secretary, Laurel.

Missouri, at St. Louis, June 7-10. George E. Haigh, Secretary, Central Missouri Trust Bldg., Jefferson City.

Montana, at Helena, July 10-15. T. P. Regan, Secretary, Helena.

Nebraska, at Omaha and Lincoln, June 12-17. Mrs. Clark Perkins, Director, Bureau of Examining Boards, Lincoln.

New Jersey, at Trenton, June 26-July 1. John C. Forsyth, Secretary, 148 W. State St., Trenton.

North Dakota, at Fargo, July 11-14. R. E. Percy, Secretary, Mandan.

Oklahoma, at Oklahoma City, June 19-22. E. E. Sanger, Secretary, Yukon.

Pennsylvania, at Philadelphia and Pittsburgh, June 21-24. W. A. McCready, Secretary, Highland Bldg., Pittsburgh.

Rhode Island, at Providence, June 27-29. Albert S. Midgley, Union Trust Bldg., Providence.

South Carolina, at Columbia, June 13. David Aiken, Secretary, Winnsboro Bank Bldg., Winnsboro.

South Dakota, at Sioux Falls, June 29-July 1. John J. Berry, Secretary, Deadwood.

Tennessee, at Memphis, June 12. F. W. Meacham, Hamilton National Bank Bldg., Chattanooga.

Texas, at Dallas, June 12-15. A. L. Nygard, Secretary, Medical Arts Bldg., Dallas.

Utah, at Salt Lake City, June 28-July 1. H. D. Brockbank, Secretary, Medical Arts Bldg., Salt Lake City.

Vermont, at Montpelier, June 26-28. H. B. Small, Secretary, Burlington.

Virginia, at Richmond, June 13. John M. Hughes, Secretary, Medical Arts Building, Richmond.

Wisconsin, at Milwaukee, June 12-16. S. Donovan, Secretary, Tomah.

ASSOCIATION OF MILITARY DENTAL SURGEONS

The Association of Military Dental Surgeons of the United States will hold its annual meeting and banquet Tuesday evening, August 8, in the North Lounge, Hotel Stevens, Chicago, Ill.

MAJOR T. J. CASSIDY, *Chairman*
311 East Chicago Ave.
Chicago, Ill.

AMERICAN SOCIETY OF ORTHODONTISTS

The annual meeting of the American Society of Orthodontists, which was to have been held on April 19-21, has been postponed to November 8-10, at Oklahoma City, Okla. All members of the A.D.A. are invited. Programs will be mailed on request.

CLAUDE R. WOOD, *Secretary*
Medical Arts Bldg.
Knoxville, Tenn.

INTERNATIONAL CONGRESS OF RADIOLOGY

The Fourth International Congress of Radiology will be held in Zurich, July 24-31, 1934. According to the Rules and Regulations, the Congress may be attended by members of radiologic societies in all countries and by persons introduced by such societies. The thirty-two countries which were represented at the Third International Congress of Radiology in Paris have been invited by the organizing committee to appoint delegates to the international committee and to nominate a speaker to report on the organization of the cancer campaign in his country at the opening session. All radiologic societies are requested to send as soon as possible a list of their members to the general secretary.

H. E. WALTHER
Gloriastrasse 14
Zurich, Switzerland

STATE OF UTAH BOARD OF DENTAL EXAMINERS

The next dental examination for the State of Utah will be given beginning June 28-July 1, at the State Capitol. All applications, fees and credentials must be in the hands of the registrar ten days prior to this date. Further information may be had by writing or communicating with the department of the secretary.

H. D. BROCKBANK, *Secretary*
Medical Arts Bldg.
Salt Lake City

AMERICAN FULL DENTURE SOCIETY

The fourth annual meeting of the American Full Denture Society will be held at the Congress Hotel, Chicago, Ill., August 6-7.

H. L. HARRIS, *Secretary*
Hamm Bldg.
St. Paul, Minn.

MONTANA STATE BOARD OF DENTAL EXAMINERS

The next examination of the Montana State Board of Dental Examiners will be held at Helena, July 10-15. For further information, address

T. P. REGAN, *Secretary*
Helena

NORTHERN OHIO DENTAL ASSOCIATION MEETING CANCELED

The Northern Ohio Dental Association will not hold its annual June session this year, owing to the approaching dental congress in Chicago and because of existing economic conditions. R. J. ARMSTRONG, *President*
2010 E. 102d St.
Cleveland, Ohio

TRANSPORTATION INFORMATION

The following information relative to fares, etc., is subject to change at any time.

RAILROADS

On account of A Century of Progress International Exposition to be held in Chicago from June 1 to November 1, 1933, all railroads have authorized reduced rates to Chicago. Those contemplating attendance at the Seventy-fifth Annual Session of the American Dental Association, in conjunction with which will be held the Chicago Centennial Dental Congress, will benefit by these substantially reduced rates, which are even more advantageous than the usual convention rate of a fare and one-half.

To secure the latest information on rates, train schedules and accommodations, communicate with the nearest local ticket agency a week or more prior to departure.

AUTOMOBILES

There will be available for general distribution in the near future an official highway map of A Century of Progress. These maps are being distributed by member clubs of the American Automobile Association. It is contemplated that they also will be made available at filling stations throughout the country.

TOURISTS' CAMPS

Developments are in progress for the erection and operation of tourists' camps and parking lots in the outskirts of the city to accommodate the motorists who do not desire hotel accommodations. It is planned to locate these camps adjacent to the main highways leading into Chicago and also adjacent to some section of the city's established transportation systems. This will enable the motorist to secure comfortable living quarters and protected parking space in the suburban areas.

Rates for tourist cabin accommodations will probably be established at $1.00 or $1.25 per person per night, with cheaper rates for groups and for longer periods of stay.

For descriptive illustrated folders address: Allen Tours, Inc., 333 N. Michigan Avenue, Chicago, or Century Cabin Camps, Inc., Suite 900, 7 South Dearborn Street, Chicago.

AUTOMOBILE PARKING

The Chicago Loop district garage and open-air parking stations, with their limited facilities, will be unable to accommodate the enormous daily influx of cars during the World's Fair. As a convenience to members, attention is called to a company that will operate a huge parking terminal with accommodations for 20,000 cars, located about fifteen minutes from the Stevens Hotel. For a very limited time, this company will accept advance reservations at attractive minimum rates. If interested in this service, apply at once to the Anthony Wayne Oil Corporation, 215 W. Randolph St., Chicago, for folders with all particulars, including a map.

AIR LINES

The one way fares applying on air lines are now equivalent to approximately rail plus pullman rates, with a 10 per cent reduction on round trips. Most fares contemplate service on multimotored airplanes, and include all travel costs except ground transportation; also, in most cases, luncheons are served while aloft. *Reductions in fares and other changes un-*

doubtedly will be made during the entire summer. Detailed information may be obtained at any air line.

BUS LINES

Practically every city, hamlet and village is now served by this mode of transportation, which is usually 25 per cent below railroad rates. Reduced round trip fares with a time limit of sixty days will be in effect. Going and returning by diverse routes will be optional at no extra cost. *Additional reductions in fares undoubtedly will be made during the entire summer.* Consult your local agent for the latest schedule on information and fares.

LAKE TRAVEL

Great Lakes steamship 1933 sailing schedules have been rearranged to provide more frequent service from all important ports. One way and round trip fares (including transportation, meals and berth) from Buffalo, Cleveland, Detroit and Duluth to Chicago are the lowest in history. Rail tickets reading via any railroad between various ports will be honored for transportation. Adjustments for meals and berth will be made by the purser aboard the steamship. Automobiles are carried at reasonable rates.

For further information, apply at any steamship office.

OCEAN TRAVEL (EUROPE)

Visitors from abroad will find ocean transportation rates a real inducement to attend the Diamond Jubilee of the American Dental Association in conjunction with the Chicago Centennial Dental Congress and A Century of Progress. Reduced railroad rates (read instructions under "Railroads") will apply from all ports of entry to Chicago.

For sailing schedules, reservations, etc., see your local steamship agent.

C. H. H. Brevig, *Chairman*
Local Transportation Committee

The Electrical Building in which Congress visitors may view the exhibits portraying the generation, distribution and utilization of electricity.

OFFICERS AND TRUSTEES OF THE AMERICAN DENTAL ASSOCIATION

1932-1933

PRESIDENT

G. Walter Dittmar.....59 E. Madison St., Chicago, Ill.

PRESIDENT ELECT

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Harry B. Pinney.....212 E. Superior St., Chicago, Ill.

TREASURER

R. H. Volland.....First Nat'l Bank Bldg., Iowa City, Iowa

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G. Walter Dittmar, President, Ex-Officio.....59 E. Madison St., Chicago, Ill.
Arthur Cornelius Wherry, President Elect, Ex-Officio.....
.....910 Deseret Bank Bldg., Salt Lake City, Utah
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Marcus L. Ward, '35.....1308 Cambridge Road, Ann Arbor, Mich.
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Albert W. Crosby, '34.....215 Whitney Ave., New Haven, Conn.
Edward H. Bruening, '33.....620 City Nat'l Bank Bldg., Omaha, Nebr.
Harvey J. Burkhart, '33.....Box 35, East Avenue P. O., Rochester, N. Y.
W. O. Talbot, '33.....Medical Arts Bldg., Ft. Worth, Texas
W. H. Robinson, '33.....American Bank Bldg., Oakland, Calif.

Try the

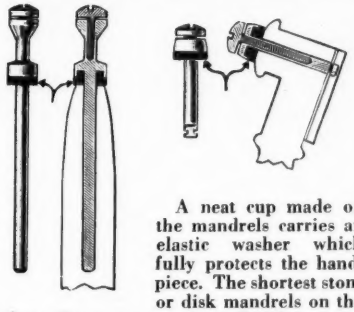
SHORT

Angle Mandrels

Y C O

No. 303

Stainless Steel Mandrels



A neat cup made on the mandrels carries an elastic washer which fully protects the handpiece. The shortest stone or disk mandrels on the market. On many occasions the short mandrels are needed and you can get shortness without cumbersomeness or exposing the handpiece by using Yco Mandrels.

Economical too
for either No. 7 H. P.
or No. 2 R. A. or C. A., 20c each
six for $1.00.

TRADE **BS** MARK
POLISHERS
PATENT NO. 1277020

The Polishers for prophylaxis. They thoroly clean not only exposed tooth surfaces but under the free margin of the gums and much of the proximal areas. Your patients will appreciate the gentleness of BS Polishers and the lack of splashing of cleaning materials. Use with Young's Mandrels for straight or angle handpiece.

May we send sample
BS Polisher and information on a highly effective method of treating Gingivitis?
FREE.

YOUNG DENTAL MFG. CO.
4958 Suburban R. W. ST. LOUIS, MO.

WARM WEATHER IS HERE

Be cool and comfortable with an

ANGELICA

SIDE-OPENING SMOCK

Leave off your collar and shirt and work in real comfort despite warm weather in this neat, professional, side-opening Angelica Smock. Made of long-wearing twill with all strain points reinforced. Choice of indestructible or detachable white pearl buttons. Sizes, 34 to 48. Each, $1.75 or 3 for $5.00. Mention size and style 41TD8.

If you remit full amount of purchase with order, we deliver free of carrying charges in the U.S. Our Professional Catalog, No. 552X, sent free on request. Please order from our branch nearest you.

ANGELICA JACKET CO.
NEW YORK—104 W. 48th St., Dept. 12
CHICAGO—175 N. Michigan Av., Dept. W
ST. LOUIS—1412 Olive Street
LOS ANGELES—1101 S. Main St., Dept. W

ANGELICA
DENTAL SMOCKS
STANDARD OF THE WORLD SINCE 1870

Classified Advertising Department

MISCELLANEOUS

BUR RECUTTING now at 20c per dozen—assorting in 1 dozen packages included—Testimonials on hand. The new "S" Bur (Wolfram Steel) 3 dozen $1.00. SCHEUN & CO., 6612 Sheridan Rd., Chicago. Established 1906.

BURS RECUT—$2.00 per Gross or 3 gross for $5.00. Over 10 years a burstoner. I recut only good burs. Send Burs today. Ellis J. Witmer Burstoning Laboratory, Middlebury, Indiana.

FOR SALE

FOR SALE—Transactions of the American Dental Association for the years 1912, 1913, 1917, 1918, 1919, 1920, 1921, 1922, 1923, 1924, 1925, 1926, 1927, 1928, 1929, 1930, and 1931, at $1.00 per copy. As there are only a few available, orders will be filled as long as they last in the order in which they are received. Address A1499, care American Dental Association, 212 E. Superior St., Chicago, Ill.

FOR SALE — The long-established and profitable dental practice of the late Dr. Newton James Baxter of 171 Arlington Ave., Brooklyn, N. Y. For particulars address Mrs. N. J. Baxter.

SINCE JANUARY 1st, 1933

A Quarter Million Dollars

has been paid for sick and accident claims. In time of stress and general business decline an unexpected loss due to accident or illness is more keenly felt.

For thirty one years these mutual societies have furnished substantial aid in the hour of need.

Over $1,000,000.00 Assets

Over $5,500,000.00 Claims Paid

Physicians Casualty Association
Physicians Health Association

First National Bank Bldg. (4th Floor) OMAHA, NEBRASKA

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TRUBYTE REFLECTIONS

VIEW A TRUBYTE DENTURE from any angle you will — features distinctively Trubyte arrest the discerning eye. ¶ Anteriorly, that matchless beauty and naturalness of tooth form and shade. ¶ Buccally, the high, sharp yet shallow bite cusps of the posteriors impress you with their power and stability. ¶ Occlusally, the deep sulci and high cusps with their many sharp facets are still more evident, revealing the secret of a Trubyte Denture's ability to hold, crush, tear and grind food with an ease and thoroughness found in no other artificial dentures. ¶ The more you examine a Trubyte Denture, the more reasons you see for making them for your patients.

THE DENTISTS' SUPPLY COMPANY OF NEW YORK

THANK YOU . . . .

All of you who sent in the coupon printed in last month's Journal.

If you have not sent it in

See Pages
A-10 and A-11

if you would care to have a personal interest in the advertising appearing in The Journal.

As a member of the dental profession would you be interested in a plan that definitely sets aside a portion of the advertising revenue from The Journal for the specific purpose of creating a demand for dentistry?

IODENT

asks you the DENTIST to pass judgment

The Iodent Co. wants you, the Dentist, to find out for yourself how much this tooth paste will aid you in your work.

We will supply you with full sized fifty cent tubes of BOTH Iodents free of charge if you ask for them on your own stationery over your own signature.

We do this because of our confidence that your personal tests and observations of Iodent results will indicate that Iodent deserves your recommendation.

THE IODENT COMPANY
DETROIT, MICHIGAN

LET US SEND YOU THESE TWO TUBES FREE

Attend the Diamond Jubilee — August 7-12 — Chicago

PERFECT ADAPTATION

THE SECRET OF PERFECT BRIDGEWORK

THE accuracy of fit between Tooth and Backing is an important factor in the construction of good bridgework.

But, whether it be adaptation of TOOTH to BACKING or of TOOTH to MUCOSA, Steele's Facings and Steele's Trupontics lend themselves readily to these two vital requirements of perfect Bridgework.

Write for Free Illustrated Technic Book

Steele's

ONCE USED . . .
ALWAYS PREFERRED

THE COLUMBUS DENTAL MFG. CO., Columbus, Ohio, U. S. A.

The Profession says:

"Pleasing in results"

Patients say:

"Pleasing to use"

Lavoris purges mouth and throat through its unique and distinctive action in coagulating and flushing out fetid, germ-laden mucous deposits.

It produces marked stimulation of blood supply and promotes tissue tone and resistance.

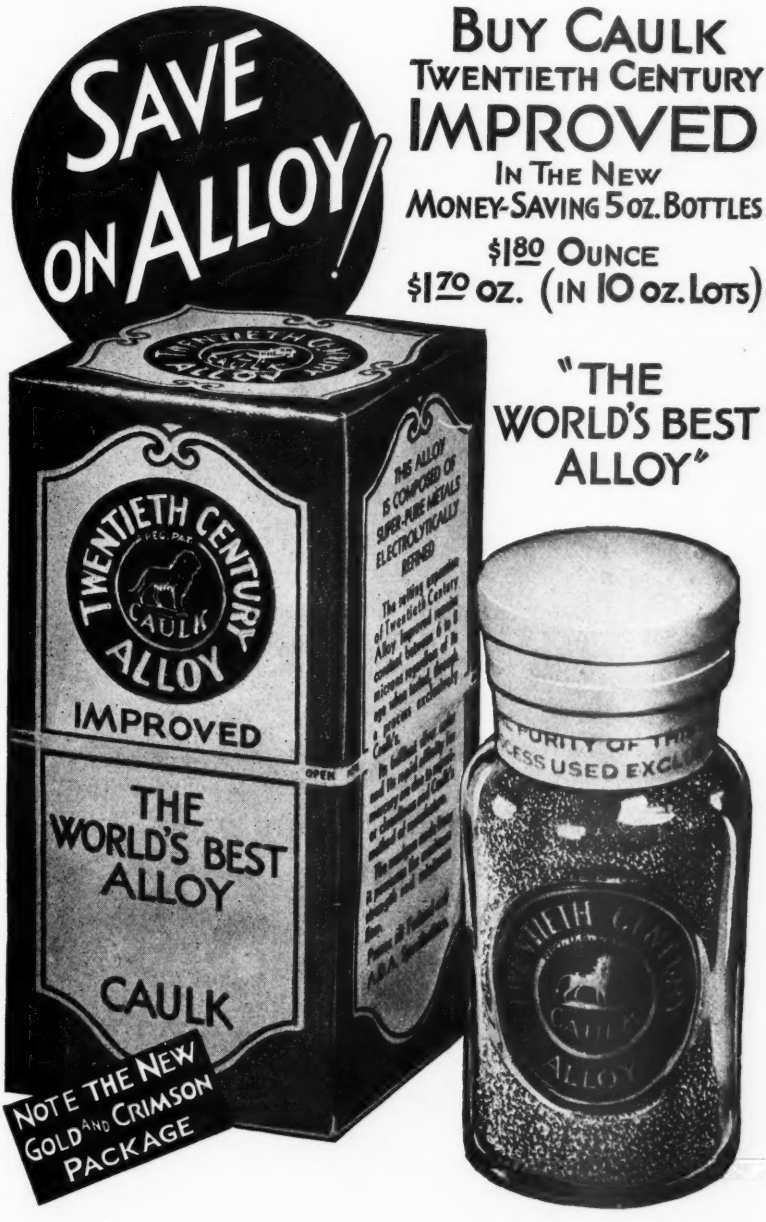
Its daily use is decidedly advantageous to mouth health.

Trial package to the profession upon request

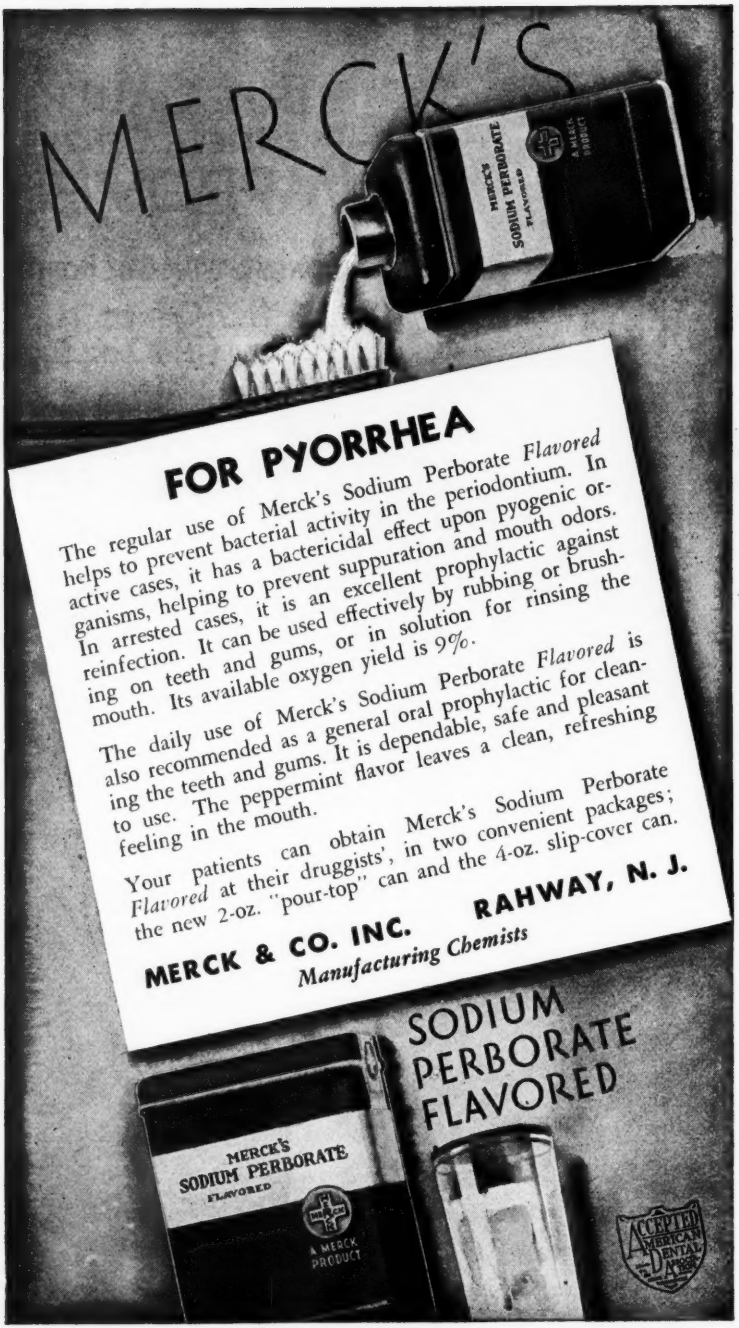
LAVORIS

THE LAVORIS COMPANY
904 NORTH THIRD STREET
MINNEAPOLIS, MINN.

LAVORIS CHEMICAL CO., LTD.
Toronto, Ont., Canada



Attend the Diamond Jubilee — August 7-12 — Chicago


MERCK'S
MERCK'S SODIUM PERBORATE FLAVORED
A MERCK PRODUCT
FOR PYORRHEA
The regular use of Merck's Sodium Perborate *Flavored* helps to prevent bacterial activity in the periodontium. In active cases, it has a bactericidal effect upon pyogenic organisms, helping to prevent suppuration and mouth odors. In arrested cases, it is an excellent prophylactic against reinfection. It can be used effectively by rubbing or brushing on teeth and gums, or in solution for rinsing the mouth. Its available oxygen yield is 9%.
The daily use of Merck's Sodium Perborate *Flavored* is also recommended as a general oral prophylactic for cleaning the teeth and gums. It is dependable, safe and pleasant to use. The peppermint flavor leaves a clean, refreshing feeling in the mouth.
Your patients can obtain Merck's Sodium Perborate *Flavored* at their druggists', in two convenient packages; the new 2-oz. "pour-top" can and the 4-oz. slip-cover can.
MERCK & CO. INC. RAHWAY, N. J.
Manufacturing Chemists
SODIUM PERBORATE FLAVORED
MERCK'S SODIUM PERBORATE FLAVORED
A MERCK PRODUCT
ACCEPTED AMERICAN DENTAL ASSOCIATION

SILLY, isn't it? But the same situation exactly can be applied to teeth. We are standing at your doorstep, making all sorts of claims for the superiority of Nuform Teeth. The porcelain is finer! The improved method of retention more dependable! The anteriors thinner, yet stronger! Etc., etc. To which you can say, like the winsome lass above—"How can I tell?"

And the same answer goes for both . . . TRY IT OUT!

UNIVERSAL DENTAL COMPANY

48th and BROWN STREETS, PHILA., PA.

ACID PHENOLSULPHONIC, LILLY
Caustic, Astringent, and Antiseptic

ANALGENTUM, LILLY
An Analgesic Ointment, Stimulating and Antiseptic

DENTAL LINIMENT, LILLY
Local Sedative for Pericementitis and Neuralgic Affections

DENTINOID (RADIOPACIC), LILLY
A Medicated Artificial Dentin for Protecting the Dental Pulp and Filling Canals

DESENSITIZING PASTE, LILLY
A Safe and Reliable Remedy for Hypersensitive Dentin

DEVITALIZING FIBER, LILLY
For Destruction of Dental Pulp

EUCALYPTOL COMPOUND, LILLY
Antiseptic

EUCAPERCHA COMPOUND, LILLY
For Filling Root Canals

EUROFORM PASTE, LILLY
Sedative and Mild Anesthetic

FORMOCRESOL, LILLY
Powerful Disinfectant for Gangrenous Pulp

LOCAL ANESTHETIC SOLUTION No. 2, LILLY
For Minor Operations

PROCAINE POINTS, LILLY
For Pressure Anesthesia

DENTAL ASTRINGENT, LILLY
Powerful Astringent, Stimulant, and Bactericide

REFRIGERANT COUNTERIRRITANT, LILLY
Counterirritant and Sedative

PHENOL COMPOUND, LILLY
Anodyne, Antiseptic, and Disinfectant

THYMOLIZED CALCIUM PHOSPHATE, LILLY
A Pulp-Capping and Filling for Small Root Canals

A pamphlet by Dr. Buckley, giving information on these preparations, will be sent to any dentist on request.

SUPPLIED THROUGH THE DRUG TRADE

ELI LILLY AND COMPANY
INDIANAPOLIS, U. S. A.

Five different dentifrices . . . .
OR ONE 5-*WAY DENTIFRICE?*

A good dental cream should include all factors of tooth protection. It should clean effectively without abrasion, irritation or lowered resistance of the membranes.

When you recommend Squibb Dental Cream, you assure your patients protection in these five ways:

1. **It cleans teeth the way you like to see them cleaned—effectively and safely.**
2. **It polishes well and safely—with complete freedom from grit.**
3. **It prevents irritation of the gums the safe way—by maintaining a hygienic environment at the gum edges and by avoiding the use of irritants or astringents.**
4. **It neutralizes the bacterial acids resulting from food decomposition.**
5. **It is economical because it gives greatest protection.**

We would like to have you try Squibb Dental Cream for yourself—to test its effectiveness—to see how clean and refreshed it leaves your mouth. We shall be pleased to send you a sample on receipt of your Professional card or letterhead.

SQUIBB DENTAL CREAM

E. R. SQUIBB & SONS,
Dental Department,
3306 Squibb Building, New York City

Attached hereto is my Professional card or letterhead. Please send me a complimentary package of Squibb Dental Cream.

Name.....

Street.....

City..... State.....

Attend the Diamond Jubilee — August 7-12 — Chicago

The Beneficial Circle of

THE letters we have received concerning our recently published statement, "A Personal Interest in Advertising," make it seem advisable to present this proposed plan in greater detail.

● It is a known fact that hundreds of thousands of dollars are being expended for advertising carried in periodicals published specifically for the dental profession. If a larger amount of advertising could be obtained for The Journal of the American Dental Association with the understanding that a definite proportion of this increase be used for public or lay educational work, the necessary funds could be made available to carry out a more comprehensive educational program with no additional burden on the profession or the trade interests. Such a plan offers the following advantages:

1. The members of the profession would have some of the money which is expended for advertising, and which they indirectly pay, used for their benefit in developing the potential possibilities of dentistry.

2. The dental manufacturers and dealers, by alloting a greater proportion of their advertising to The Journal, would not be called upon to make larger advertising expenditures than now contemplated.

3. The manufacturers and dealers would get the expected direct return from such additional advertising copy carried in The Journal.

This fact is evidenced by the survey made recently by the Hutchins Advertising Co., Inc., the object of which was to determine the extent of professional interest in the various dental publications. The number of "first choices" received by those publications which received any first choices was as follows:

Journal of the American Dental Association	86
Second publication	35
Third publication	28
Fourth publication	25
Fifth publication	17
Sixth publication	7
Seventh publication	4
Eighth publication	3
Ninth publication	2

4. In addition, the manufacturers and dealers would benefit by the resulting expansion of dentistry, for they can only prosper in direct ratio to the public's demand for dental service.

The Advertising Dollar!

IN order to picture how this would work, the following tabulation is tentatively set forth:

Minimum advertising revenue to be set aside and not included in amount to be considered in determining available funds for educational work	$50,000.00
(This represents the expected revenue if this plan was not operating.)	
Excess of advertising revenue over the above amount would be split 50% to The Journal and 50% for lay educational work.	

Assuming that the revenue from advertising was increased to $75,000.00 the following distribution could be made:

Revenue from advertising	$75,000.00
Deduct $50,000.00 reservation (explained above)	50,000.00
Balance	$25,000.00
50% of balance to be used for educational work	$12,500.00
50% of balance to cover cost of printing and handling of this additional advertising	12,500.00
	$25,000.00

NOTE: With the already existing facilities and organizational connections available to the Association, this lay educational fund would produce greater results than the amount shown would indicate. *The possibilities in this plan are limited only by the interest and support given it.*

You Can Do Your Part by Filling In the Coupon

2

I will support the above plan.

NAME..... ☐ Member A. D. A.
☐ Manufacturer
ADDRESS..... ☐ Dealer

Send to American Dental Association—212 E. Superior St., Chicago, Ill.

This Plan Has Been Reviewed and Approved by the Board of Trustees.

TRUE DENTALLOY complies with A.D.A. and Federal Specifications for dental alloys

S.S. White

TRUE DENTALLOY

at Greatly Reduced Prices

Known throughout the world for its reliability, True Dentalloy now makes an appeal for increased popularity through a very substantial reduction in cost to the dentists.

• THE NEW PRICES •

1 ounce Bottle	**$1.80**
5 ounces—per ounce . . .	**1.65**
10 ounces " "	**1.55**

Always dependable, always full weight in the bottles

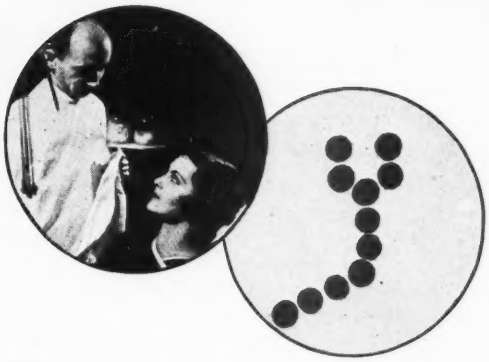
TRUE DENTALLOY

for fillings that endure

The S.S. White Dental Mfg. Co.

Attend the Diamond Jubilee — August 7-12 — Chicago

Pleasant for the Patient...



Yet powerfully Antiseptic

YOUR patients feel no smart or sting when you use Hexylresorcinol Solution S. T. 37. It does not burn their tongues, nor produce offensive chemical tastes or odors. It cannot injure delicate membranes.

Yet Hexylresorcinol Solution S. T. 37 does its work well. You can depend upon its thorough antiseptic qualities. It is stronger than carbolic acid in any usable solution—kills vegetative organisms on less than 15 seconds' contact. Because of its low surface tension it spreads quickly over microscopic surface irregularities—penetrates crevices where bacteria breed.

• • •

Hexylresorcinol Solution S. T. 37 is entirely safe—non-toxic even if swallowed—may be recommended unhesitatingly to your patients for home use. Hexylresorcinol Solution S. T. 37 may be obtained at all druggists in the United States and Canada in 5-oz. bottles—50¢, 12-oz. bottles—$1.00.

HEXYLRESORCINOL SOLUTION S.T.37

(Liquor Hexylresorcinolis 1:1000)

PHILADELPHIA **Sharp & Dohme** BALTIMORE

Attend the Diamond Jubilee — August 7-12 — Chicago

half measures AREN'T ENOUGH!

PAINTING **the puncturable rubber diaphragm of your cartridge with iodine or wiping it with alcohol is at best, only a half measure.**

There is one way — AND ONLY ONE WAY — to make sure that your patients receive the protection against infection that comes from a complete chain of sterile precautions in the administration of a local anesthetic. . . .

Sterilization *by Heat*

You sterilize your cartridge syringe by boiling; you boil or flame your needle. Now, to complete the chain, you *must* sterilize the puncturable surface of the cartridge container by heat, so that no contamination may be carried from the outer surface of the cartridge into the solution.

Only Metal Cap Anestubes permit thorough sterilization of this surface —by *heat.*

NOVOL METAL CAP ANESTUBES, too, contain Novol 75 Anesthetic solution—isotonic, isosmotic, non-hemolytic and bacteriostatic.

Use Metal-Cap Anestubes— Sleep well o' nights!

NOVOCOL CHEMICAL MFG., CO., INC.
2921-23 ATLANTIC AVENUE, BROOKLYN, N. Y.

Attend the Diamond Jubilee — August 7-12 — Chicago

© Dr. H. W. Ferguson's Toothland Puppet Show. Reprinted Here by Permission.

MEET THEM

at the Dental Exhibit
Hall of Science
June, July, August

• •

THREE SHOWS DAILY

11:00 A. M.
2:00 P. M.
4:00 P. M.

Jimmy Chew and Dr. Ferguson . . . .

. . . they're to be at your Exhibit in the Hall of Science at the Century of Progress. Most novel and interesting educational Puppet Show of the day. Don't let your patients miss it. For both adults and children. What interests us is that Jimmy Chew says teeth like to chew gum. He is a tooth and ought to know and you, being dentists (not to mention being human), know whether Jimmy is right.

THIS PAGE IS PAID FOR BY THE NATIONAL ASSOCIATION OF CHEWING GUM MANUFACTURERS

N-19

ANNOUNCING

THE NEW MODEL B RITTER X-RAY UNIT

An Outstanding Advance In X-Ray Design and Performance

IT'S SAFE. X-ray transformer immersed in oil in upper compartment - tube housed in lower compartment of thoroughly insulated two compartment rotary head.

IT'S EFFICIENT. Powerful specially designed straight line focus tube gives ample penetration for densest structure encountered in dental diagnosis.

IT GIVES UNIFORM RESULTS. All essential factors fixed. No variables. Uniform density and detail in all films.

IT'S FLEXIBLE. Perfectly balanced compensating bracket and rotary operating unit or head, permitting quick, effortless directing of ray of tube.

IT'S STURDY. Utilizes new type of X-ray tube which has been subjected to tests equivalent to fifteen years of service at rate of two full mouth X-ray examinations per day. Bracket and head assembly tested to ten times strength required in actual use.

IT'S ACCESSIBLE. New Ritter patented construction - permits the replacement of tube in five minutes without necessity of removal of apparatus from office.

IT'S COMPACT. Always ready to use - never in the way. Compact folding bracket and head.

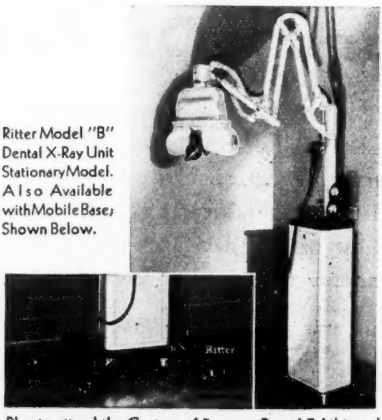
Booklet now in course of preparation.

Ritter

Ritter Dental Manufacturing Co., Inc.
Dept. A. D. A. - 6, Rochester, N. Y.
Please send complete literature on new Ritter X-Ray Unit.

Doctor .....

Address .....



Ritter Model "B" Dental X-Ray Unit Stationary Model. Also Available with Mobile Base, Shown Below.

Plan to attend the Century of Progress Dental Exhibit and joint August meeting of the American Dental Association and Chicago Dental Association

Attend the Diamond Jubilee — August 7-12 — Chicago

The Banking Moratorium...

was a necessary thing for the country but at the same time it brought difficulties. Among other things, it prevented the forwarding of membership cards in as prompt a manner as usual. There is still some delay in this respect but most of the trouble has been cleared up. It also brought a deluge of letters from the members, some of which we are carrying below:

"Valley Park, Mo.

I have not received the Journal for April. My dues for 1933 are paid. I would appreciate the April Journal as soon as you can send it.

Respectfully,
Dr. A. P. W."

"Buffalo, N. Y.

The other men in our building have received their April number of the Journal but I have not. May I have one?

Very sincerely,
Dr. M. L. F."

"New York City

To date I have not received the April edition of the Journal. Will you please give this matter your attention? Thank you.

Cordially yours,
Dr. Z. E."

"Chicago, Ill.

Have not as yet received the April issue of the Journal.
Dr. J. A. H."

"New York City

As yet have not received the April issue of the Journal of the A.D.A. Would appreciate a copy of same.

Very truly yours,
Dr. W. H. J."

"Boulder, Colo.

What has become of my American Dental Journal for April?
Dr. H. C. C."

"Brooklyn, N. Y.

As there has been some delay in having my membership transferred from Chicago Dental Society to Second District Dental Society in New York, I wish you will not discontinue mailing the Journal to me.

Yours truly,
Dr. E. H."

"Newark, N. J.

I have not received the copy of the Journal for this month. Kindly mail me same and oblige.

Very truly yours,
Dr. I. B."

"Chicago, Ill.

To date I have not received the April issue of the Journal. Will you kindly mail one to me. Thank you.

Very truly yours,
Dr. C. I. S."

"Jenkintown, Pa.

I failed to receive this month's issue of the Journal of the A.D.A. and as I have paid my dues, including the subscription to the Journal, I would appreciate very much the receipt of same.

Very truly yours,
Dr. J. G. F."

"Glen Ridge, N. J.

I did not receive my copy of the Journal for this month. Will you kindly send me a copy of the current issue, Vol. 20, No. 4, so that my file may be kept intact?

Yours very truly,
Dr. E. M. G."

"Waco, Texas

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Yours very truly,
Dr. C. F. R."

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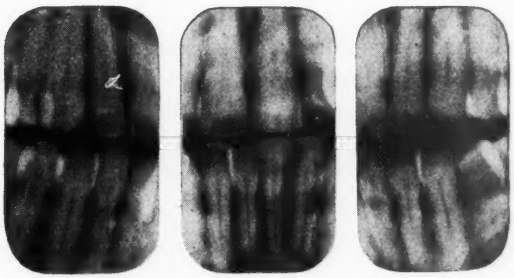

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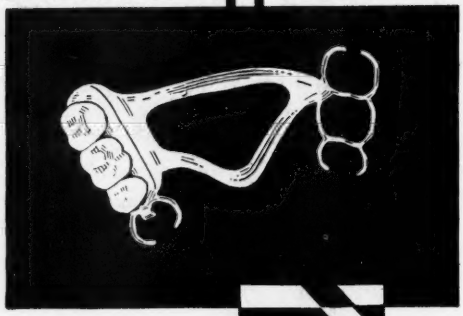

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